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ACORN USER

AUGUST 1987 BEST-SELLING AND BIGGEST BBC/ACORN MAGAZINE

NEW BBC MICRO
RISC

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THE 1987 ACORN USER exhibition

Full story inside






Commander Stryker under fire in the city


Battling in the air


An action close-up


Enemy equipment (Enhanced BBC Master version)


A camouflaged Battle fortress (Enhanced BBC Master version)

STRYKER'S RUN for the BBC Micro B, B+, Master, Master Compact, and Acorn Electron

Stryker's Run features probably the best graphics ever seen on the BBC Micro or Acorn Electron; the action is intense and the animation is superlative.

The battlefield graphics include cities, edifices, wrecked buildings, trees, gravestones, bridges, despatch-posts, military bases, helicopters and jet ships, with hills and mountains in the background. The Master-enhanced version also includes statues, watch-towers, a neglected cafe, a deserted cinema, aircraft hangars, aeroplanes, trucks and tanks.

For many years, a war has ensued between the Allied Nations and the Volgans. The battle was reaching a stalemate position, but recently the Allies through good intelligence work and some luck have managed to obtain the plans of the Volgan's next offensive. If the Allied Forces can capitalise on these plans they can end the impasse and the war. You play the role of Commander John Stryker commissioned to take this top-secret information to the Allies' HQ.

Your character in the game can jump, run, duck, fire his laser pistol and throw grenades. He can also board aircraft and fly them, making use of their more powerful weaponry.

Your opponents, the Volgans, have a variety of weapons at their disposal comprising rifles, pistols, grenades, machine-guns, mortars, mines, helicopter gunships, rocket launchers and SAM missiles.

Stryker's Run is one of our most successful releases ever. It has topped the BBC Micro software charts for six weeks and received several glowing reviews: *"The graphics are stunning . . . This should be in every collection"* enthused A & B Computing.

Enhanced Version for the BBC Master Series

Stryker's Run is the first release to include a specially enhanced version for the BBC Master making use of its 128K of RAM.

An extra 40K of detailed graphics are provided together with additional game features and atmospheric music.

BBC Micro Cassette	£9.95	BBC Micro 5¼" Disc	£11.95
BBC Master Compact 3½" Disc	£14.95	Acorn Electron Cassette	£9.95

The screen pictures show the BBC Micro version of the game.
The graphics of other versions may vary.

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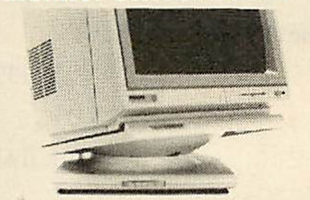
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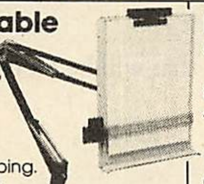
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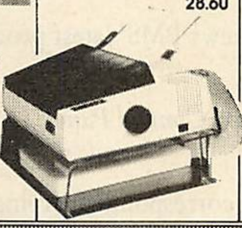
A3 Version 42.45
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Printer Stand

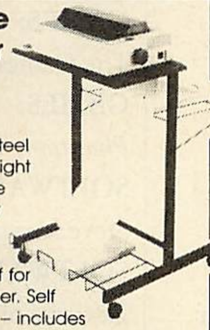
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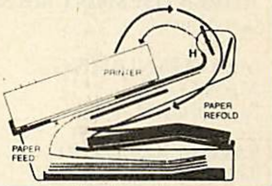
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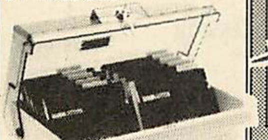
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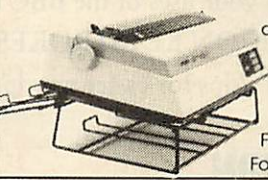
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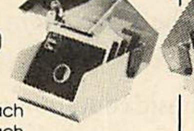


Wire Printer Stand



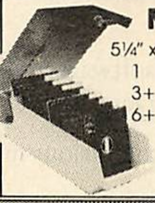
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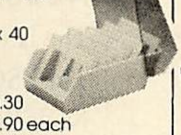
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ACORN USER

ISSUE No 61 AUGUST 1987

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COVER



Photograph by John Barlow

NEXT MONTH

Discs and digitisers special: Full Archimedes benchtest, Joe goes Greek and David Lawrence tells you how to squeeze more files onto a disc

TWILLSTAR COMPUTERS LTD

Computers

MASTER 128

Complete With Internal Software	£420.00
Master Turbo Upgrade	£113.95
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The Master 512 upgrade board incorporates the Intel 80186 processor, plus 512K bytes of RAM. Digital Research DOS+, which is copatible with both MS/DOS version 2, and CP/M 86, allows you to run a large proportion of the most useful programs available. A dual 80 track disc drive is required to run programs on the 512. Provided free with 512 upgrade board are three GEM packages, GEM Desk Top, GEM Write, GEM Paint.

NEW

UNIVERSAL SECOND PROCESSOR

This allows you to connect co-processor boards designed for the Master Series to your BBC Models B or B+. Fitting a Turbo board boosts the BBC's already rapid performance to twice the speed of the standard processor. Fitting the 512 co-processor converts the BBC micro into a 16 bit machine, opening up new possibilities within the world of MS-DOS and CP/M 86. **£86.25**

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FILESTORE EO1	£952.00
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Econet Upgrade Kit	£49.00
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Based on Master Compact 128. The Twillstar package includes Compact 128, latest version of the View Word processor, single 640K disk drive, monochrome monitor, correspondence quality printer. All connecting cables for above and also 5 disks and some paper **£635.00**

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SYSTEM 1 (inc VAT) **£414.00**
128K *Single 640K Drive* *UHF Modulator* *Bundled Software*

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MD 802E Dual 400K Double Sided	£249.00

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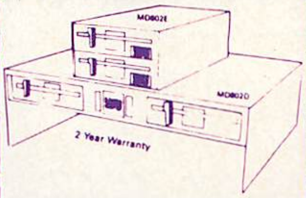
Winchester Disk Drives

Source HD20 Twillstar's 20 Mbyte winchester drive including Acorn ADFS ROM complete with P.S.U. **£599.00**

Source HDP201 Twillstar's 20 Mbyte winchester drive and a 400k double sided floppy drive built in a plynth to accomodate monitor on the top and the computer underneath. Includes ADFS ROM and P.S.U. **£869.00**

Source TS10 10 Mbyte tape streamer backup unit with utilities £695.00

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Further 64k upgrade available.

Printer/Computer sharers.

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6 – 1	£79.00

Serial and Parallel T Switches

Parallel T switch	£67.85
Serial T switch	£67.82

FLOPPY DISKS

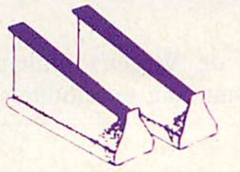
Raven 5¼" pack of 10 in a clear library box	£15.00
Raven 5¼" rainbow colour pack of 10 in library box	£17.00
Raven 3½" single sided pack of 10 in library box	£18.00
Raven 3½" double sided pack of 10 in library box	£25.00

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NEWS

Quest Mouse launch

Watford Electronics is hoping to grab a large slice of the mouse market with its latest product, the Quest Mouse.

Launched in conjunction with a chip-based art package, *Quest Paint,* the mouse boasts a rubber, non-slip ball and high quality construction.

Quest Paint, which comes on a 32k ROM chip, claims to have more features than any other art package available.

It has advanced cut and paste facilities, allows the full screen area to be used and can incorporate pictures created by Watford's digitiser.

The Quest Mouse costs £40.25 and *Quest Paint* sells for £39.10. Alternatively, you can buy the two together for £67.85. Watford can be contacted on (0923) 37774.

News in brief

■ *Compute* magazine covers games on the BBC and Spectrum micros — and some of the cover price is donated to charity. It costs 30p. Details from *Compute*, 22 Church Vale, London N2 9PA.

■ A company called Fatsoft has produced an email package for people running networks on S J Research file servers. Features include 80-column screens, multi-level access and data encryption. Write to Fatsoft, 106 Hervey Road, London SE3 8BX.

■ People still confused by the Data Protection Act may be interested in a new pamphlet just published by the registrar. It's a brief set of guidelines and is available from The Data Protection Registrar, Springfield House, Water Lane, Wilmslow SK9 5AX. Tel: (0625) 535777.

RISC micro to star at show

Acorn has chosen the *Acorn User* Exhibition to unveil its RISC-based micros, to be called Archimedes (see page 11). And several companies will be showing software for them.

Acorn provided development versions of the micros to several software companies which have traditionally been in the BBC micro market. But software development has been hampered by constant changes to the RISC operating system and late delivery of the windowing environment.

However, Acorn claims the system is now finalised, and a range of products should be ready, or nearing completion by the time of the show.

According to Computer Concepts' spokesman Charles Moir, the company's future output will be 'almost exclusively ARM-related'.

Computer Concepts has been working on Atari ST software, but Moir said that software for the Archimedes will not be ST conversions.

The company's first product for the machine will be *Disc Doctor 2*, an ARM version of the very successful BBC micro utility package. It should be out by September, followed by versions of the *Inter* series and *Wordwise Plus* wordprocessors, designed to run under the 6502 emulation program.

The main Computer Concepts' package for the RISC machine is a wordprocessor — without a title as yet. The new software is a full WYSIWYG wordprocessor which makes full use of the RISC windowing environment.



The new AMX mouse

Other features include: multiple columns on screen; full use of the Archimedes' fancy fonts; multiple line headers and footers; footnotes which can include graphics; and a built-in spelling checker.

Clares has also been busy. The company is producing software to be sold – or given away – under the Acorn label, but won't release details yet.

Other packages which Dave Clare would reveal include *Alpha Base,* a free format database which is file compatible with *Beta Base.*

At Acorn's suggestion, Clares has adopted the Archimedes name for its toolkit utility package, which is modelled on *Ramrod.* But no name has been decided as yet for an art package.

Advanced Memory Systems (AMS) has close links with the machines. The new AMX mouse is the same model as the one already supplied by Acorn with the machine.

Minerva is producing several database systems for the Archimedes. They're based on existing packages, like *System Delta,* but use the full facilities of the machine, such as its windowing and use of a mouse. The first is *DeltaBase*, a general purpose database, which was used as a test bed for the more advanced packages. Minerva is releasing the package at a price of £24.95.

System Delta Plus is a more sophisticated database package, with a capacity only limited by the available storage, and allowing complex searches and maths operations. *Delta Plus* is fully programmable and will cost £69.95.

PC runners wanted

Acorn User would like to hear from anyone running PC software on the Master 512. We're trying to put together an up-to-date list of compatible software and programs.

Please give an idea of how thoroughly you have tested the software, as programs often run for a while and then crash when you try to do something awkward – like printing out a file! Send any information to PC software, *Acorn User*, 141-143 Drury Lane, London WC2B 5TF, or email us on Telecom Gold, 81:RED001.

Diary dates

Here are a couple of dates for your diary. Westech is a computer show for the west of England. It is at the Bristol Exhibition Centre, October 20-22. Call Markethill Exhibitions on (0272) 650908.

The Logo Workshop '87 offers three days of practical experience for people in education and youth work. It runs from August 24-27. Contact British Logo Users Group, PO Box 79, Walsall WS5 3RW.

Blunderbox

There was a minor error in the Joe's Jottings *Calculator* in June's yellow pages. Line 320 should be:

```
320 IF k=1 PROCcl:ENDPROC
```

This allows the clear button on the calculator to work properly. In July, a slip with the scalpel caused a problem with *Copyfiles-II*. There should have been a comma in line 610:

```
610 DIM dir$(31),file$(31)
```

And line 900 should read:

```
900 IF key$="1" THEN system$(out)="ADFS" :link$="_"
```

Ecosystem launched

New Domesday System interactive videodiscs have been launched by the BBC and Epic.

BBC Enterprises has produced the *Ecodisc*. It's a practical guide to ecology based on the Field Studies Centre at Slapton Ley Nature Reserve in south Devon.

The idea is to draft a plan to manage the reserve and its activities by discovering and applying ecological facts and ideas. Users can take 'walks' round the area, use a boat on the lake, see the reserve from a helicopter, and so on.

The material is aimed at ecology and GCSE studies, but the BBC says it should prove useful in areas like geography, environmental studies, computing and technology studies. The price should be under £300.

Other products from the BBC include the *Domesday Display* software which allows you to present pictures and data from video discs as a 'slide show'. And future software will allow users to integrate their own data with that held on the video disc.



A scene from *Ecodisc*

Epic's disc is entitled *Introduction to Solid State Electronics*. It's a complete course in analogue electronics intended for City and Guilds students. Another disc covering digital electronics is expected soon.

BBC Enterprises is at Woodlands, Wood Lane, London W12 0TT. Epic can be contacted at 7 Leicester Place, London WC2H 7BP.

Watford DFS

Watford Electronics has updated its double density disc filing system which works in both single and double density modes, and has automatic 40/80-track sensing. Error checking can be switched off or speed up disc operators, and ADFS compatibility is possible with an additional ROM.

It costs £39 from Watford Electronics, Tel: (0923) 37774.

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Next month's Acorn User

ARCHIMEDES A complete benchtest of Acorn's new RISC micro.

JOE'S JOTTINGS If the technique of getting your printer to handle special characters is all Greek to you, Joe Telford could have the answer to your prayers. Joe shows how to get your micro to speak Greek and you might even learn enough to survive the tourist battlefields of Mikonos.

FIRST BYTE The ever popular Tessie Revivis shows how to call machine code routines, and pass parameters to them.

HINTS AND TIPS Another lucky dip of handy hints, including a *FIND command to help you locate any file on an ADFS disc.

HARD DISCS Are Winchesters worth the expense? We take a look at the pros and cons, and examine some of the leading 20Mb units.

128 DFS Need more files on a disc, but don't want to use ADFS? David Lawrence shows you how.

DIGITISING Phil Wilkes explains digital image processing, as well as a review of digitising packages.

QUEST PAINT Watford's new art program and mouse are put through their paces.

GAMES David Lawrence does his usual round up of the games scene, plus reviews including a look at the *Xor* designer.

RISC revealed

Acorn has announced its long-awaited RISC technology micros, to be called the Archimedes series. As predicted by *Acorn User* in June, two new machines will carry the BBC name.

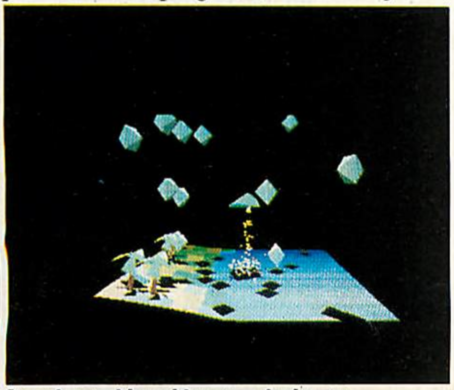
The Archimedes series is no less than four computers, ranging in price and capability from the basic A305 0.5Mb machine to the A440 with a 20 Mb hard disc plus four Mb of RAM. You can see them first at the *Acorn User* Show in the Barbican Exhibition Hall on July 23-26.

The A305 will cost £975 with monochrome monitor and single 3.5-inch disc drive; the one-megabyte A310 machine costs £1235 with a colour monitor. The comparable price for a Master 128 mono system would be about £700. There should be 2000 A305 and A310 machines available between July and September, with volume deliveries to dealers starting in September. The 400-series machines will be unveiled later in the year; prices are yet to be announced. A440 delivery is planned for November and the A410 should be available from next January.

Anyone familiar with the existing BBC micro should feel at home with the Archimedes. The new machines can run much existing BBC micro software. The inclusion of BBC Basic 5 means that the Archimedes will run most well-written and legal Basic programs for the model B or Master. And it will run them between 15 and 25 times faster than a model B. A 6502 emulator will run other software – for example the entire *View* family – just as if it were running in a Master Turbo co-processor. But programs, like most games, which don't follow the programming rules and won't run in a co-processor, and so won't run under the emulator either.



The new micro's innovative use of WIMPs and linked menus



Superb graphics aid games designers

The Archimedes operating system supports most of the star commands of the existing BBC micro. But in addition, it has a full colour windows, icons, menus and pointers (WIMP) system as shown above, with a screen resolution of up to 640 by 512. Some screen modes have up to 256 colours, chosen from a range of 4096 shades. Games too will benefit from the graphics and speed – for example David Braben's game (shown left) in which a mouse-controlled craft flies over a scrolling tropical landscape which will appear on the Welcome disc.

The Archimedes will contain four times as much ROM as the Master 128. But for the first batch of 2000 machines, not all the intended half-megabyte of ROM will be fitted. Parts of the operating system will be supplied on disc, to be loaded into RAM. However, all these machines will be upgradeable through a special registration system when the final 512Kb operating system ROM is available.

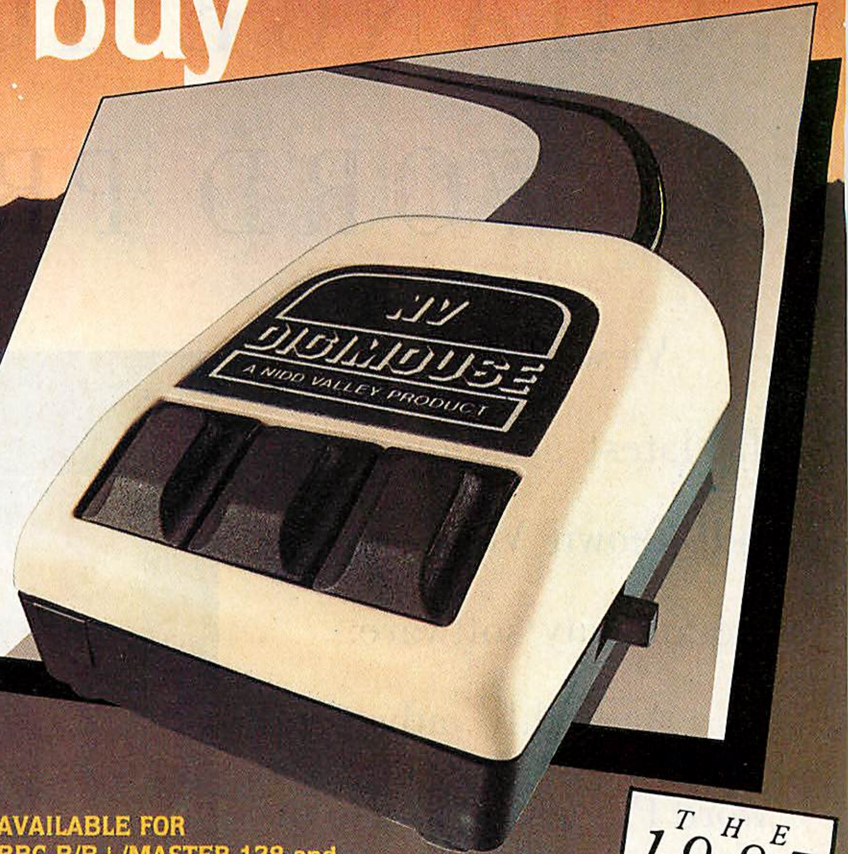
All this doesn't mean the end of the Master series. Acorn says it intends to continue manufacturing and selling both the Master 128 and Compact 'while there remains a demand', and managing director Brian Long stated 'the Master 128 has sold better than expected against the 16-bit competition' over the last year. And in view of the price difference, the Archimedes won't appeal to everyone, so Masters will be around for some time yet.

The graphics and speed of the Archimedes should lend themselves to complex applications such as computer-aided design and desktop publishing. Acorn plans to release Fortran 77, Cambridge Lisp and C in September, and Comal and Pascal by the end of the year. Most of these languages have already been seen on the ARM Development System. New developments include a version of *View Professional*, an integrated version of the *View* family, which will be available for the existing BBC micros too.

Other companies working on new or converted software for the RISC machines include Clares, Computer Concepts, AMS, Minerva, Grafox, GST, AutoCAD, Logotron and, of course, BBC Soft.

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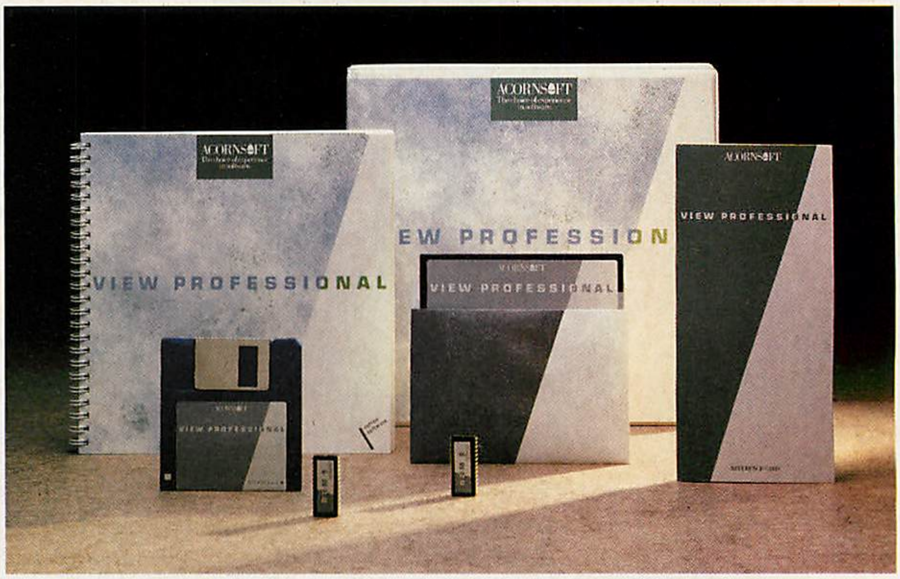
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Easy to use, View Professional is suitable for the BBC B, B+, Master 128 and Master Compact and costs £99.95. A version for Archimedes will be available later in the year. View it now at your local Acorn dealer.

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NEW ACORN MICRO

Archimedes for under £1000

Externally, the Archimedes' design is of the 'three pale grey boxes' variety favoured for business micros. There is a separate keyboard unit, main system box and monitor. The keyboard and main case are common to the whole Archimedes range, and a mouse also comes as standard.

The keyboard is a major departure for Acorn – it will be most familiar to those who have used an IBM PC recently. The key layout is almost exactly the same as the PC-AT enhanced keyboard, though the legends on the keys are more in line with the BBC micro – Escape instead of Help, for example. It's a big keyboard, with normal QWERTY keys, numeric keypad, cursor keys and editing keys all in separate blocks. On the 305 and 310, the red function keys (12 of them) and a flip-up key-strip holder remain as a landmark for BBC users – the keys will be grey on the Acorn-badged versions.

The Reset key is carefully recessed at the back of the keyboard, well beyond typing error range. Little legs under the keyboard allow it to be tilted to a comfortable typing angle and the unit is connected to the main system box by a single curly lead and mini-DIN plug.

A similar connector is used for the mouse – it plugs into the rear of the keyboard unit. A Swiss-made three-button affair of very high quality, this mouse is soon to be sold under the AMX label too!

The circuit board inside each of the machines is the same four-layer PCB, complete with RAM, ROM, the ARM chip, memory controller, video controller and I/O controller. Also fitted are the 1772 floppy disc controller chip (as used in the Master Compact) and a real-time clock (familiar from the Master 128). But the hard disc controller chips and circuitry to drive high-resolution multi-sync monitors are only fitted to the 400 series Archimedes. These will be dealer-only upgrades for the 300 series. The table summarises the difference between the machines.

Standard interfaces on the rear of the main case comprise parallel, serial, monitor and sound ports. The parallel printer port is a 25-way D-type socket similar to that on the IBM PC, and the serial port is the same nine-way socket as a PC-AT. Another nine-way D-type connector gives analogue RGB output for colour monitors;



The Archimedes' keyboard is influenced by IBM's PC-AT

mono output is on a phono socket like the Compact. The sound port is a 3.5mm stereo jack socket, so you can just plug in your Walkman headphones or connect the sound output to your hi-fi.

The connectors have been changed from those used in the original BBC micro, partly to give more industry standardisation (you can use the same cables as with an IBM PC to link to the printer or modem), and so that the Archimedes meets radio interference regulations in force abroad. It is also for this reason that the main case is a complex metal construction.

All the machines are available either without a monitor, with a 14-inch colour monitor or with a 12-inch white-screen monochrome monitor. But the Archimedes cannot be used with a domestic television. The monitors are Philips units, similar to those supplied with the Master Compact. Neither of them can take advantage of the three highest-resolution modes (modes 18, 19 and 20) giving 640 by 512 pixels – for this, you need both the extra high-resolution circuitry and a 'Multi-Sync' monitor that can interpret the special video signals for these modes. The most common at present is the NEC Multi-Sync monitor, costing about £600, but other models are appearing on the market and the prices of these units are now falling.

THE ARCHIMEDES MICROS

	A305	A310	A410	A440
Mono system	£975	£1065	£1665	£2700
Colour system	£1150	£1235	£1840	£2875
Without monitor	£920	£1005	£1610	£2645
Badged	BBC	BBC	Acorn	Acorn
Function keys	Red	Red	Grey	Grey
RAM	0.5Mb	1Mb	1Mb	4Mb
Upgradeable to	1Mb	–	4Mb	–
Second 640k disc drive	Optional	Optional	Optional	–
Expansion backplane	Optional	Optional	Standard	Standard
(needed for podules)	Two-slot	Two-slot	Four-slot	Four-slot
Modes 18-20 circuitry	Optional	Optional	Yes	Yes
Hard-disc controller	Optional	Optional	Yes	Yes
20Mb hard-disc	Optional	Optional	Optional	Yes
Volume delivery	Sept '87	Sept '87	Jan '88	Nov '87

Mac-like Arthur

For reasons best known to Acorn, the Archimedes operating system is called Arthur. It supports all the star commands of the existing BBC micro, and can be used in the same way – *CAT to catalogue a disc and *FX 5 to control the printer for example. But Arthur has been extended.

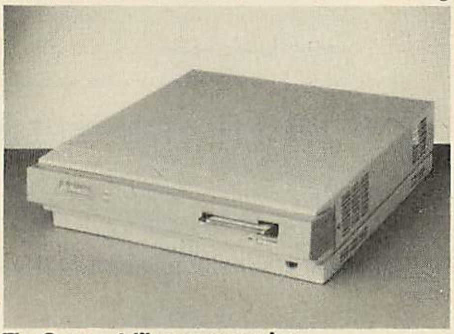
First, a full windowing system has been added so that any program can use windows, icons, menus and the mouse-controlled pointer. This is the kind of 'user interface' which has proved popular on the Apple Macintosh, and on business PCs fitted with front-end software like Microsoft *Windows* and *Gem*.

Arthur also supports 'relocatable modules' – machine code programs that can be loaded at any memory address – and a context-switching facility so that several windows running different programs can be active at once.

The video controller chip in the Archimedes, VIDC, can provide up to 1000 by 1000 pixel resolution, but Arthur makes use of only part of this. Screen modes 0-7 of the existing BBC micro are duplicated, although mode 7 is a software simulation – there is no special teletext chip. The new modes are shown in the table below. Because normal monitors can't display 512 pixels vertically, a special multi-sync monitor is necessary to use modes 18-20.

Sound on the Archimedes is also controlled by VIDC, with eight stereo sound voices. Sounds are no longer controlled by envelopes; instead a data table must be set up in memory which VIDC uses to generate the sound waveform. Several default waveforms are provided, but almost any sound could be constructed with the appropriate data. Commands enable the eighth voices to be positioned independently on the sound stage.

The ADFS supplied with the Archimedes is similar to the existing ADFS, and the new machine can read existing 640k ADFS 3.5-inch discs like those from a Master Compact. But the filing system has been rewritten to improve its speed, and a new format allows up to 800k on a single disc.



The Compact-like processor box

SCREEN MODES

Mode	Resolution	Colours	Text
8	640x256	4	80x32
9	320x256	16	40x32
10	160x256	256	20x32
11	Text only	4	80x25
12	640x256	16	80x32
13	320x256	256	40x32
14	Text only	16	80x25
15	640x256	256	80x32
16	Text only	16	132x32
17	Text only	16	132x25
18	540x512	2	80x64
19	640x512	4	80x64
20	640x512	16	80x64

A big welcome

The Welcome disc for the Archimedes will contain tutorials on the keyboard and ADFS, several powerful utility programs, and a game written by David Braben, co-author of *Elite*. The utilities include a musical front-end to complement the machine's sound capabilities, a painting program and a set of graphical fonts. The fonts are outline fonts, and can be scaled to any size, in contrast to those on the Macintosh which come in only a small range of sizes. There is also a font designer program included.

Bundled with the Archimedes is the 6502 emulator: this will run any 'legal' BBC micro program, just as if it were running in a turbo co-processor. Most programs run under the emulator at about the same speed as they do in a BBC micro; some with a lot of input and output activity run faster. Most people will use the emulator to run languages like *View* – surprisingly, this works in the new 132 column modes.

The fifth amendment

The Archimedes series machines are supplied with BBC Basic version five. This should run all properly written programs from earlier versions of Basic. But the language has been extended, with enhancements to existing commands, as well as many new structures and commands to control the new Archimedes hardware. And, of course, it runs fast: the *Byte* 'Sieve' benchmark for finding prime numbers is completed in 8.4 seconds. In comparison, a 32-bit Compaq Deskpro 386 takes 21 seconds, an Amiga takes 66 seconds and the Atari 1040ST 85 seconds. The new *PCW* benchmark results are shown in table 2 opposite.

Among the most important new introductions are two new control structures. One of these is WHILE... ENDWHILE, which works like a REPEAT loop except that the loop may be executed zero times – the statements in a REPEAT loop are always executed at least once. Also new is CASE. Similar to the statements in Comal and Pascal, this allows you to choose one from a number of options.

Enhancements include multi-line IF... THEN statements, new or extended commands to control the colour and sound of the new machine and also the ability to continue the program after an error, even within a loop or procedure.

Another major new feature concerns passing variables to procedures. At present, only the value of the variable is passed – the procedure works on a copy of the variable, not on the variable itself. Now procedures can pass the values of variables back to the main program using the RETURN statement.

Arrays can be passed to procedures too – the procedure can find the size of the array with a new DIM function. Procedures can have local arrays as well. And a range of new matrix operations like:

newarray () = oldarray ()

have been added.

Although Basic 5 is in the Archimedes ROM, an extended version provided on the Welcome disc also includes extensive help text describing the syntax of each of the commands. This runs slightly faster than the ROM Basic, because the ARM processor accesses the RAM much quicker than ROM.

Plenty of room for expansion

A key feature of the original BBC micro is its expansion potential – second processors, modems, printers and teletext units all just plug in. The Archimedes too has plenty of scope for add-ons.

Most fundamentally, extra RAM can be added to the A305 and the A410, to bring them up to 1Mb or 4Mb respectively. The extra RAM for an A305 should cost £102. Fitting this is a simple job, as the sockets are provided on the circuit board. But neither of the A300s can be upgraded beyond 1Mb.

Other plug-in options for the machines include a second floppy disc drive, and Econet. The Archimedes accepts the standard Master series network card, and can be attached to an Econet system along with ordinary BBC micros.

Other expansion options are arranged around the system of peripheral modules, or 'podules' about the size of a videocassette, which plug into a expansion connector or 'backplane' inside the main Archimedes box. A backplane accepting up to four podules is standard on the 400 series. But the 300 series requires an optional two-podule backplane to be fitted before any podules can be added. This option should cost £40.

Three podules are planned for delivery between September and November. First comes an I/O unit, which will give the Archimedes the user port, 1MHz bus and analogue port connections of the 'original' BBC micro and Master series. However, while your peripherals may plug in, their software may need updating before they work. An extension to the I/O podule will be a MIDI interface, so the micro can control electronic musical instruments. Next on the list is a ROM podule, allowing ROM-based Archimedes software to be plugged in for instant access.

An important option will be a podule aimed at giving the Archimedes a measure of IBM-PC compatibility. The plug-in card contains a separate processor, and software to emulate the PC. Acorn corporate communications manager, Michael Page, said that Acorn 'does its best to retain compatibility with what has gone before', so the podule is expected to be based on the 80186 processor and DOS Plus software used in the Master 512 co-processor.

Who will buy it?

According to Brian Long, Acorn intends to sell the Archimedes to its traditional buyers – and that means education, plus the users in science and industry, and, of course, home users. But it doesn't just mean the United Kingdom: the micros have standard features aimed at making their appeal more international. A third of Acorn's business is already conducted overseas, and this proportion is set to rise in the future.

For educational buyers, the primary attraction is the Archimedes' speed and graphics. This gives plenty of scope for developing easy-to-use educational software, using the Macintosh-like windows, icons, menus and pointers (WIMP) system provided by the Arthur operating system. There is to be a new discounting scheme for volume purchasers, details of which have yet to be announced.

But acceptance of the Archimedes in education rests partly on the outcome of a heated debate: some local education authorities now see MS-DOS capability as a necessity for education, despite the fact that it will most likely be obsolete by the time today's students reach the job market. And few MS-DOS applications are specifically educational.

Acorn sees its main rivals in the educational sector as being Apple and Research Machines Ltd. Both RML and Apple are specifically targetting education with new or updated machines. But Acorn has the advantage of a more powerful micro, at a significantly lower price. The A305 is almost half the cost of a Macintosh SE, and closer to a third of the price of the IBM-compatible Nimbus VX386.

Scientific and industrial users have needs similar to people in higher education. Raw processing power and the ability to use large amounts of memory should prove attractive, as will the early availability of languages like Fortran and Lisp.

For current BBC home users, the temptations of the machine surely lie in compatibility, in the capabilities of its graphics and sound, as well as the speed which allows Basic programs to run as fast as machine code on the existing BBC micro. But most home users don't use the full power of their BBC micros in their own programming – only commercial packages stretch the computer to its limits. Graphics, publishing applications and musical programs are areas where current BBC micro software is severely limited by the design of the machine. And so the domestic demand for the Archimedes relies on advanced application software – which will take some time.

For the home market, Atari and Commodore also have capable, though less powerful, 16-bit machines in the ST and Amiga ranges. The 68000 processor that both use is typically five times slower than the ARM. Both machines are comparable in price to the Master 128, but are hampered by lack of compatibility with either the IBM-PC or the BBC micro (and with BBC Basic in particular). In effect, Atari has conceded this argument already, with its long-standing intention to supply a BBC Basic emulator. This is still 'close to completion', and is reported to run Basic programs rather slower than an Electron.

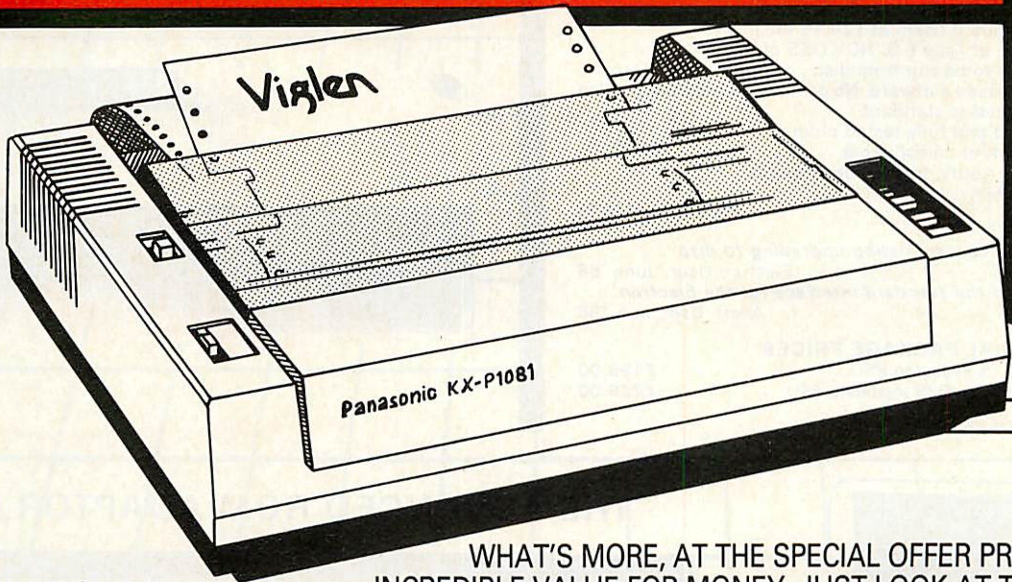
BENCHMARK PERFORMANCE (TIMES IN SECONDS)

	Archimedes		BBC B	Compact	Amiga 2000
	Basic 5 ROM	Basic 5 RAM	Basic 2	Basic 4	Amiga Basic
intmath	0.35	0.26	2.80	2.22	1.7
realmath	0.38	0.28	6.18	4.62	2.7
triglog	1.41	1.02	71.7	33.2	6.7
textscrn	4.4	4.2	23.0	19.4	150.3
grafscrn	6.9	6.5	21.9	22.4	25.0
store	16.5[1] 6.5[2]	16.5[1] 6.5[2]	22.0[3]	39.2[1]	32.7

1 Old 640k ADFS format 2 New 800k ADFS format 3 200k DFS format

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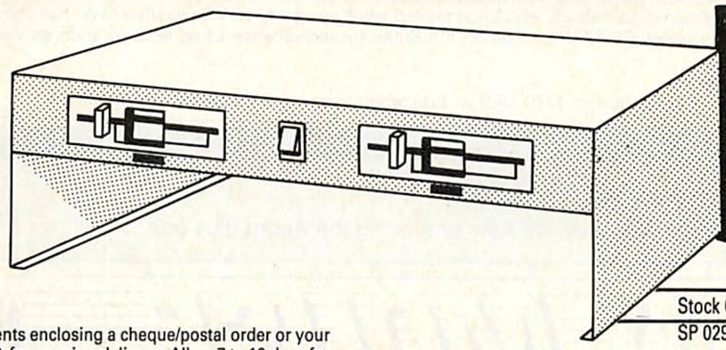
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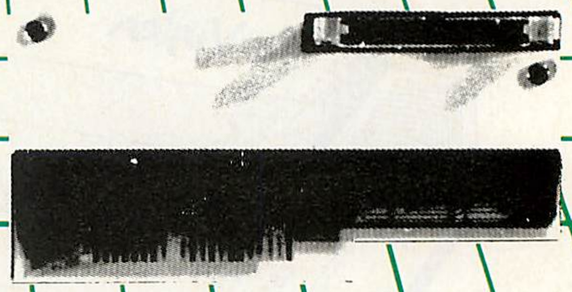
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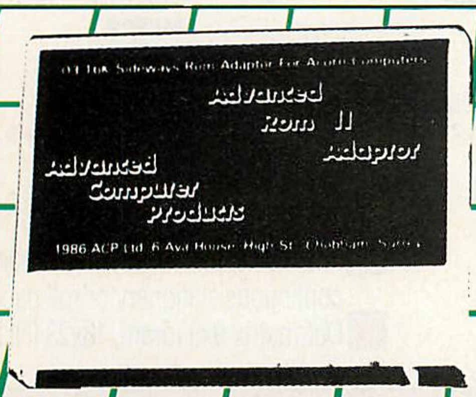
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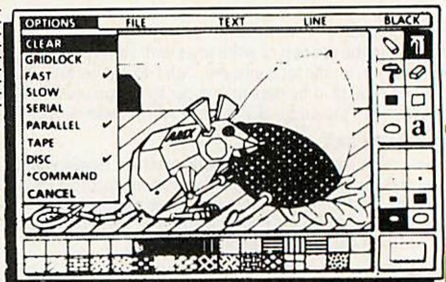
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20 sensor=0: heat=1: switch=2: REM inputs
30 lamp=0: fan=7: REM outputs
40 REPEAT
50  IF <sensor>OFF TURNON<lamp> ELSE TURNOFF<lamp>
60  IF <heat>ON TURNON<fan>:PAUSE<60>:TURNOFF<fan>
70 PAUSE<120>: REM wait for two minutes
80 UNTIL <switch> OFF
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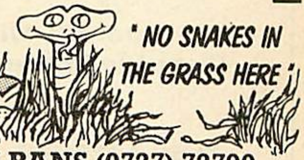
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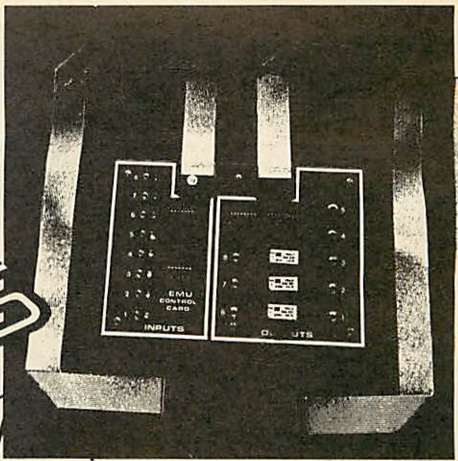
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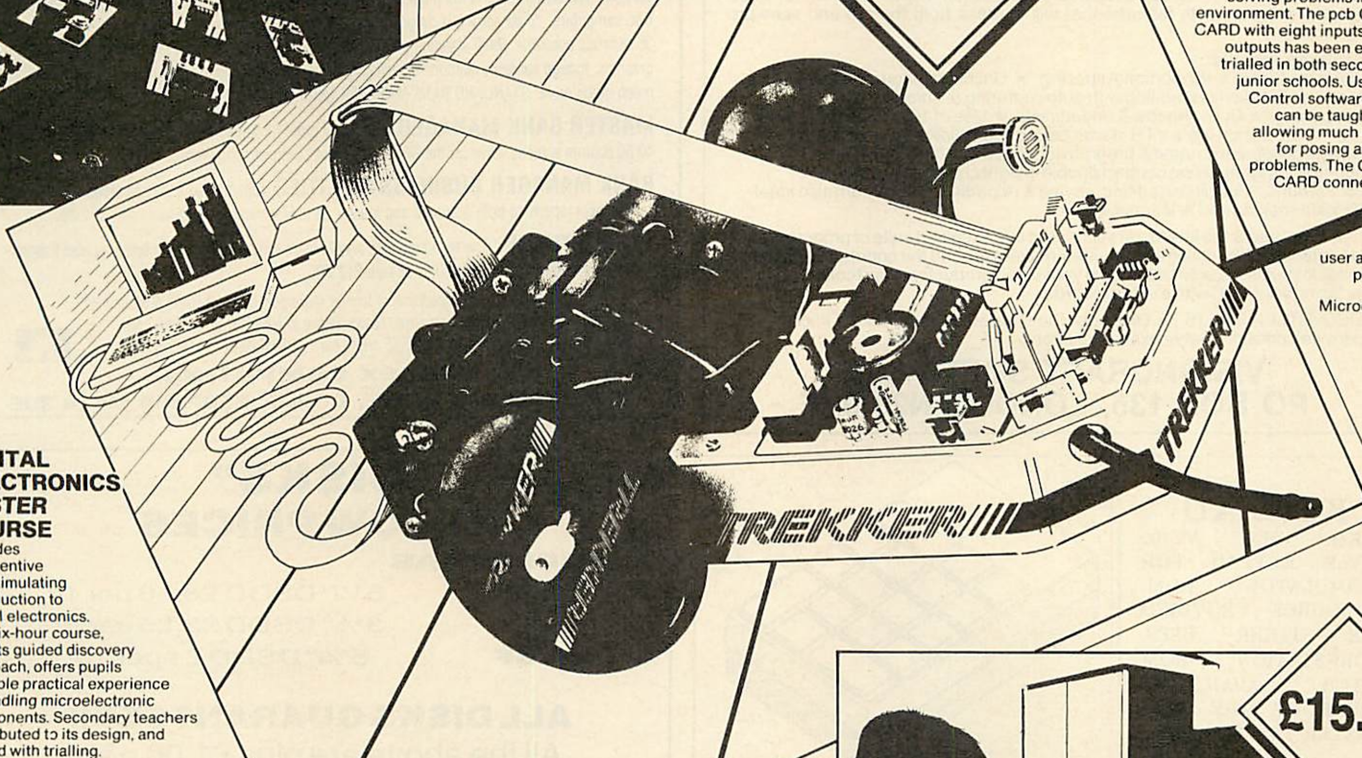
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CONTROL CARD

Another very useful tool for problem solving exercises and computer control studies, the CONTROL CARD will shortly be available alongside other group products. Ideal for introducing the computer as a device controller, and solving problems in a control environment. The pcb CONTROL CARD with eight inputs and eight outputs has been extensively trialled in both secondary and junior schools. Used with In Control software facilities can be taught quicker, allowing much more time for posing and solving problems. The CONTROL CARD connects to the user and printer ports of the BBC Microcomputer.

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Provides an inventive and stimulating introduction to digital electronics. The six-hour course, with its guided discovery approach, offers pupils valuable practical experience in handling microelectronic components. Secondary teachers contributed to its design, and helped with trialling.



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The taster course contains a re-useable self-contained kit, requiring no special environment or mains supply. It allows teachers with little or no previous knowledge to create the first awareness of modern micro-electronic technology, and stimulate an interest for further studies. Some of the areas covered by the course include recognition and use of *resistors and capacitors*, current flow, a lamp flasher circuit with audible alarm, binary to decimal conversion with automatic/manual counting and decimal display.

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An inexpensive guide to using the BBC Micro-computer as a monitor/controller of various devices. The eight-hour course follows a set of Pupil Worksheets, from BASIC program writing to controlling the 'loco' of an N-gauge model railway. Central to the course is the versatile interface card, with 19 in/out sockets, which connects the BBC Micro-computer user port.

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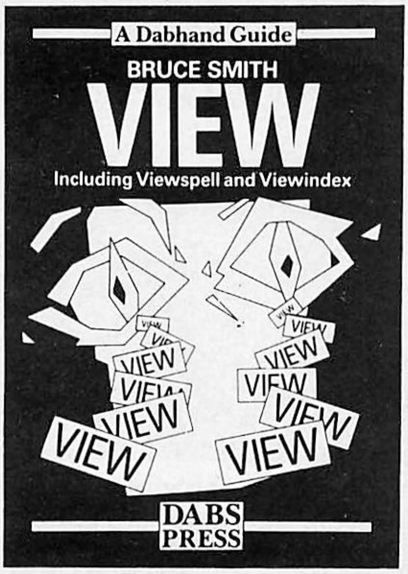
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VIEW GUIDE

AU OFFER

Bruce Smith's Dabhand book



Bruce Smith has covered all aspects of wordprocessing in this comprehensive guide to *View*.

The 240-page book covers: Command and Edit mode, Rulers and Margins, Saving and Loading text, Boot files, Markers, Formatting and Justification, Search and Replace, Stored Commands, Page layout, Printer Drivers, Macros, Handling Long Documents, Hints and Tips, *View* Manager, Machine Code utilities, *ViewSpell*, *ViewIndex* and OverView, Utility programs, *View* version changes, Quick reference, Printer Control codes and Technical notes. Applicable to the BBC B, B+, Master 128, Compact and Electron.

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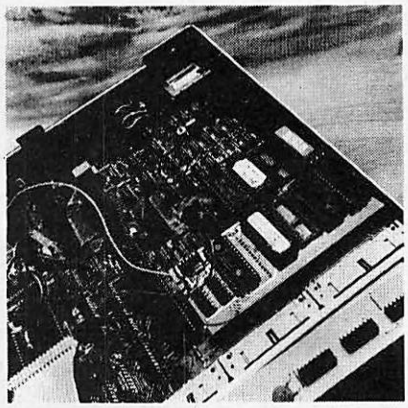
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RAMBOARD

AU OFFER

ROM/RAM Expansion Board



Edinburgh Software Products' Sideways ROM/RAM board is being offered to *Acorn User* readers at a bargain price of only £64.95, a saving of £10.00. The board allows any BBC model B micro's memory to be fully expanded, up to a total of 256Kbytes. Four sideways RAM banks are fitted as standard and the board will accept up to six sideways ROMs (16Kbyte or 32Kbyte chips).

This well-built board simply plugs in to the circuit board, so no messy soldering is necessary. Compatibility is good; unlike some other sideways RAM boards, the user port is not corrupted, and the board works with shadow RAM boards too. It has been tested with a wide variety of software and has worked without problems.

The board is British made and comes with excellent after sales support. A battery back-up upgrade can be fitted to the RAM, as can read/write protect switches.

As written in *Acorn User* when we reviewed the board last month, 'This board rates as one of the best I've seen. The overall quality is excellent – well laid out and robustly made.' You won't find a cheaper or easier way to upgrade your micro's memory than this.

Please note this board is only for the BBC model B.

Please send me __________ ROM/RAM boards at £64.95.

I enclose my cheque/postal order payable to Edinburgh Products Ltd for £ __________ (including Postage and Packing)

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Come along and say hello

While you're at the exhibition, drop in and say hello. *Acorn User* will be on stand 24. We'll have the latest issues of *AU* and *Educational Computing* on sale, as well as the usual back issues, discs and tapes.

There will be special deals on bumper back-issue bundles, and a '14 issues for the price of 12' subscription offer.

We'll be demonstrating our latest software package, *Calligraphy*, which is based on the popular *Desalet* program and contains many new fonts. And business users will be able to take a look at the *ViewChart* graphics software.

Acorn User staff and contributors will be on hand to answer any queries you may have about the magazine or your machine.

Finally, our tireless merchandising supremo, who wishes to remain self-effacingly anonymous, wants us to point out that the famous *AU* tiger family will be on the stand.

Archimedes arrives!

Acorn's most important new set of products since the launch of the original BBC micro in 1979 will be unveiled to the public for the first time at this year's *Acorn User* Exhibition at the Barbican.

The Archimedes series of RISC-based micros is an important step for Acorn. The company has been left behind by the trend towards 16-bit and 32-bit machines, and has felt the squeeze as suppliers of MS-DOS business micros push into the education market.

With the Archimedes, Acorn now has a machine using leading-edge technology and with graphics and sound that will enable it to compete against – and in some respects greatly out-perform – machines like the Commodore Amiga and the Atari ST series.

Acorn is looking to the education market for most of its sales, but it will want to woo home users too. The machine's superb graphics and sound will attract the more serious home users, although it's unlikely many people will buy it to play games on.


Get your hands on the new micro at the *AU* show

You're unlikely to be able to pick up a machine at the show. Supplies will be limited at first, and Acorn will have all the demonstration machines firmly bolted down! In any case, with the entry-level machine costing in the region of £1000 it's hardly the type of thing you buy in impulse. So take a look at the machine at the show and decide for yourself whether it's worth saving up.

■ Several software companies hope to be showing early – or even finished – versions of their RISC products. They include Computer Concepts, with utilities and wordprocessing, and AMS with its art package (see page 7).

ROMboard out

Vine Micros has produced another version of its ROM board for the Master.

As its name suggests, the ROMboard 4 takes up to four ROM chips which, as far as the machine is concerned, occupy the places normally used by either the sideways RAM banks or the cartridge slots – you select which. External switches are also available which allow you to choose between the Master's own ROM sockets or the ROMboard's.

The product can also be used in conjunction with the previous ROMboard 3, which overlays the Master's built-in ROM software.

The cost of the ROMboard 4 is £29.95. Prices for the switching units will be available at the show.

Mouse-based Genie on show

PMS is launching several products at the *Acorn User* show, including utilities for *Genie* and a new version of the desktop package which works with any AMX-compatible mouse.

The *Genie* utilities disc includes facilities to transfer data between *Genie* and various database programs.

There's also a utility to print out information contained in the diary as a week, month or year planner. The disc is £9.95, although there's likely to be a special show price.

The mouse version of the package is offered as an alternative to the normal version and there's an exchange service for existing owners.

PMS is also launching a book on NLQ printing.

Win a RISC micro

There will be lots going on at the show. Acorn is giving away two Archimedes machines as first prizes in competitions.

One competition has been run in local newspapers throughout the country, with regional prizes provided by Superior Software. The other competition is London-based.

■ Please note that the Thursday is for bona fide trade and education visitors only. If you fall into that category you'll be able to get in free.

■ If you're coming along on the other days, and haven't already bought advance tickets, bring along the coupon below for a 50p discount.

THE 1987 ACORNUSER exhibition

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July 23-26 Barbican Exhibition Halls, London EC2. Thursday (Trade and Education only) 10am-6pm, Friday & Saturday 10am-6pm Sunday 10am-4pm. British Rail; Holborn Viaduct, Moorgate, Cannon St, King's Cross, St Pancras, Liverpool St. Tube; Moorgate, Barbican, St Paul's, Bank, Liverpool St.

New releases from Audiogenic

At one time it looked as though Audiogenic was going to miss the show. But the company has sorted out its personnel changes and at the eleventh hour put together what it calls 'a small but lively stand'.

New releases which should be on show include *Omega Orb*, reviewed on page 139, and *Graham Gooch's Test Cricket*. There should also be the first sighting of *Ransack* – the latest game by Peter Scott, and other new games by Gary Partis and Dean Lester.

Gary Partis and Peter Scott will be making guest appearances on the stand, and Audiogenic will be selling software at discount prices.

Kid's Castle

Fernleaf will be using the exhibition to show off its new historical strategy game, *Castle Under Attack*. Designed for nine to 14-year-olds, the program is set in medieval times and played between two sides – one attacking the castle, the other defending it. The game can be saved and resumed later.

Castle Under Attack is compatible with all BBC micros and is available in both 5.25-inch and 3.5-inch formats. It costs £17.95, with extra players booklets in packs of 10 at a price of £4.95.

Hybrid launches complete synthesiser package

By Steve Mansfield

Hybrid has combined its music products for the BBC micro into one complete package and will be showing the system, along with the new Music 4000 keyboard, for the first time at the *Acorn User* Exhibition.

Hybrid will be using the show to demonstrate its products, and you'll also be able to have a go yourself. The new package consists of the Music 5000 synthesiser unit, the Music 4000 keyboard plus software, including Hybrid's music programming language Ample.

All you need to add to get an advanced polyphonic synthesiser is a BBC micro. The system comes with 80 predefined sounds, including imitations of a wide range of instruments – as well as abstract and special effects sounds.

The keyboard is 'live' with all the software, including the music editing and composition programs. That means you can play a note and see it appear on the on-screen stave.

The software offers real-time 'recording', with the option to automatically correct your timing. And you can always edit the tune later.

The complete package of Music 5000, Music 4000 and software costs £330, making it an inexpensive synthesiser – particularly when you consider the sophisticated software. Existing Music 5000 owners can get the keyboard for £169.



The Hybrid Music System with *Mixing Desk*

Other products are also on the way. The Music 2000 is a MIDI add-on which will enable you to control MIDI-equipped instruments using Hybrid's Ample music language. The Music 1000 amplifier is aimed at schools, and provides three headphone outputs.

On the software side, Hybrid is releasing its first two albums. *Cosmix* and *Ample Bytes Back* are both available on floppy disc. And *Ample Microworlds 1* is a set of educational programs based on the Music 5000. All will be shown for the first time at the show.

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Sentinel	14.95	12.95
Revs	14.95	12.95
Elite	14.95	12.95
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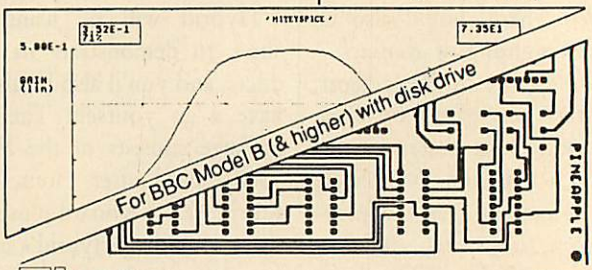
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BBC B MASTER ECONET

Oxford Pascal is the most popular full extended implementation of PASCAL for Acorn machines.

"The code produced is very compact" Acorn User

"I can wholeheartedly recommend it to Pascal novices and experts alike" Computer Weekly.

The Oxford Pascal package contains

1) A Resident compiler. This compiler runs entirely in RAM and provides a very fast and convenient way to learn the language and debug programs. Using the resident compiler is like using a BASIC interpreter in that programs are ready to run in seconds.

2) A full disk to disk compiler producing relocatable object files. This compiler is capable of compiling very large programs (e.g. the compiler itself!)

3) The LINKER. This extension to standard Pascal allows you to break up programming tasks into small separately compilable files and then link them together into a single object module. Whenever you make a change to a file you need only compile that file and relink. Because you can work with short files you can use the resident compiler even for developing large programs.
The LINKER also allows the building of libraries.

4) The LOCATOR. This utility allows you to produce stand alone programs which run on any machine without the Pascal system.

Oxford Pascal allows many extensions to standard Pascal including:

- program chaining
- sound extensions
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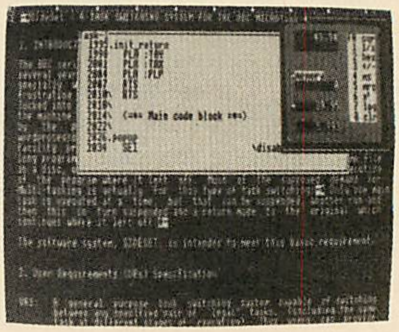
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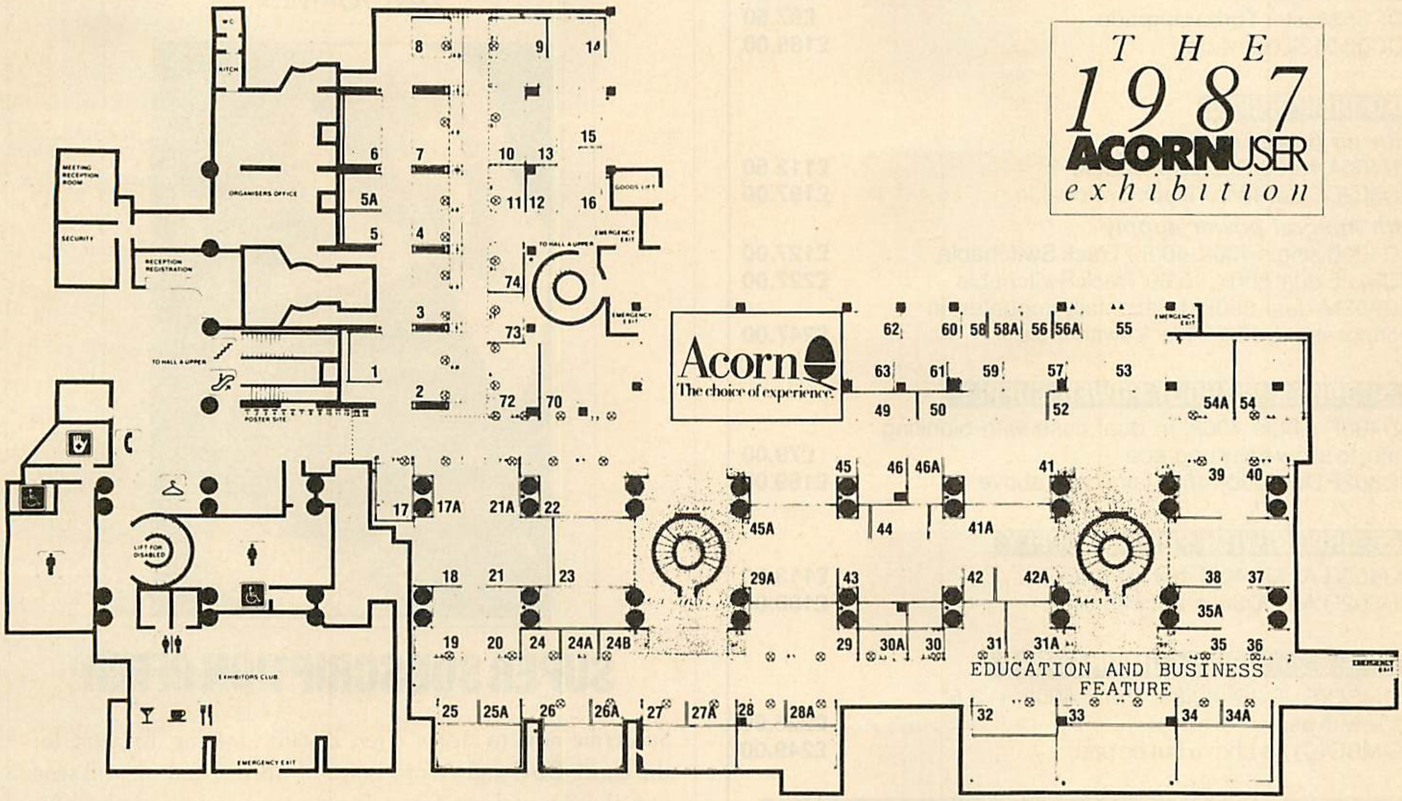
e.g. **Calendar / Diary, Calculator, Notepad** and **Address book** etc., which may be called from within any application, (e.g. INTERWORD, VIEWSHEET etc).

SEE IT AT THE SHOW
on stand no 24a.

Sideset is supplied as a plug-in chip with disc utilities. A full list of the features of Sideset is too extensive to list here. Further details can be obtained from:

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Getting around

To save you the trouble of dashing around in search of elusive products, *Acorn User* has arranged a free product location service.

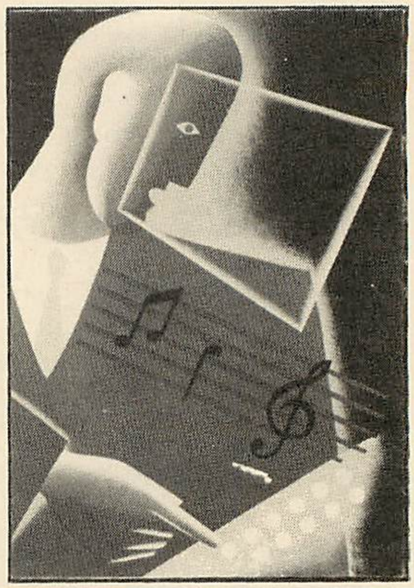
All you have to do is tell the person on the reception desk what sort of product you're interested in – you're allowed up to three categories – and the database will spring into action, providing you with a printout, showing a map with the relevant stands marked.

If you prefer to find your own way around there will be an inexpensive show guide on sale, with a stand-by-stand description of all the exhibitors and their wares.

People with advance tickets should put pen to paper before arriving. If you look at your tickets you'll see various sections that have to be filled in, detailing your interests and so on. Please fill these in before getting to the hall.

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Vital information

Times

Thu 23 July – 10am to 6pm
Fri 24 July – 10am to 6pm
Sat 25 July – 10am to 6pm
Sun 26 July – 10am to 4pm
Note: the first day, July 23, is for bona-fide trade and education visitors only.

Prices

Trade and education day – free
General public – £3

Venue

The Red Hall, Barbican Exhibition Hall, Golden Lane, London EC2.

The entrance to the hall is on Golden Lane, which is off Beech Street. Don't go to the Barbican Centre or concert hall or you'll probably turn up just too late for next year's show.

The area is well-served by public transport. Liverpool Street is the largest railway station within walking distance, Moorgate is closer still, and Cannon Street and Holborn Viaduct are both nearby.

If you're coming by tube, aim for the Barbican. When you get out of the station, walk down the underpass on Beech Street and Golden Lane will appear on your left. Alternative stations are Moorgate, St Paul's, Bank and Liverpool St.

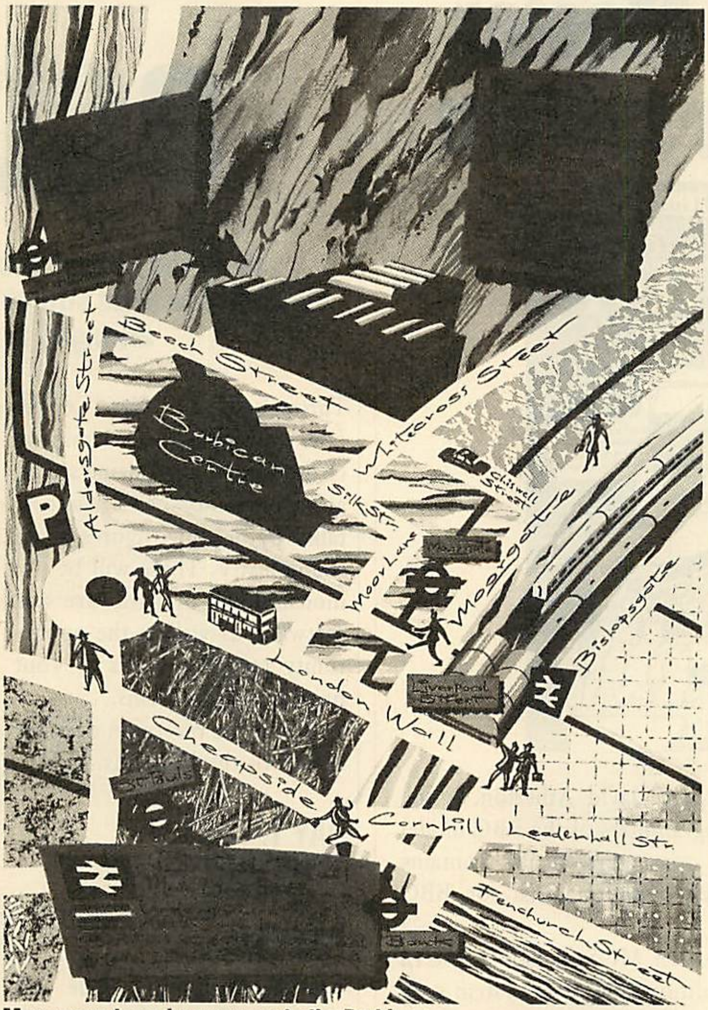
Buses are less common, but the No 4 will take you to the Barbican underground station.

If you're coming by car, Beech Street boasts two NCP car parks next door to the hall and on the same level, giving easy access for people confined to wheelchairs.

There are facilities for the disabled, including lifts. But if you have any special requirements or questions, ring the *Acorn User* Exhibition Hotline.

Exhibition Hotline 01-836 2441, extension 240.

Getting there



Many ways to make your way to the Barbican

Surviving the show

It's hell in there I tell you! *Acorn User* shows are not for wimps. There are massive bargains to be had, and the latest in hardware and software to see, so it will be popular.

Fortunately, there are ways surviving. Your best tactic is to take everyone by surprise and arrive early. That gives you time to look around, suss out the best offers and play with the equipment before the hall gets packed out. Many special offers sell out – a good reason for getting in quick.

Wear comfortable shoes. You'll walk around the hall a thousand times, looking for the stand you saw once but now seems to have disappeared.

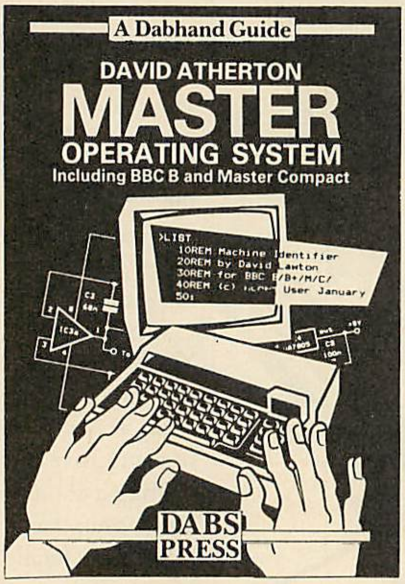
Bring a shoulder bag, which leaves your hands free to tap keys and fondle equipment. Many exhibitors will provide carrier bags with their products or brochures, but you'll soon wish you'd brought something more substantial.

And talking of substantial things, food can weigh heavily on the mind – but hopefully not on the stomach – after you've walked the equivalent of 14 marathons. There is catering at the hall, with cold snacks and 'fork food'. We're assured it's all very tasty, and if you need your spirits raising there is also a licenced bar.

MOS GUIDE

AU OFFER

Guide to Master operating system



This new book from Acorn expert David Atherton, is the definitive reference work for programmers of the BBC model B+, Master 128, and Compact computers. It also contains much a considerable amount of useful material for BBC model B and Electron users.

It covers all features of the Acorn MOS including 65C12 opcodes (including Rockwell additions), all new system calls and previously unpublished filing system notes.

The book is liberally sprinkled with program listings, which are available on disc. The *Programs Disc* also contains some extra utilities.

Please send me:

____ copies of *Master Operating System: A Dabhand Guide* at £12.95 each.

____ copies of book and 5.2-inch disc at £16.95 (£1.00 discount).

____ copies of book and 3.5/inch disc at £17.95 (£2.00 discount).

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Please allow 28 days for delivery.

SHOW GUIDE

Plan of action

Of all the attractions at this year's show, the ones to head straight for are these seminars arranged by *Acorn User*

Throughout the show, *Acorn User* will be running seminars, chaired by the magazine's staff and contributors, and featuring talks by leading figures from the industry. There will be demonstrations of hardware and software, as well as the opportunity to get answers to your queries and problems.

Ask at the reception desk for details of the locations.

DAY 1. THURSDAY 23 JULY

Education

This is the special trade and education day, and starts with an opening address in the main hall at 10.00am. The rest of the day breaks down like this:

10.00am – 1.45pm.
New trends in software
Chaired by Joe Telford, *AU* columnist and assistant director of the Cleveland Educational Computing Centre. The session will cover what's happening in the world of software, developments with Logo and the implications of the RISC technology for software development, plus demonstrations.

2.00pm – 3.00pm.
Interactive video in practice
Chaired by Tony Quinn, editor of *Acorn User* and *Educational Computing*. There will be demonstrations of videodiscs and the Master AIV system.

3.15pm – 5.45pm.
Networks: more than just a big disc drive
Chaired by Graham Bell, technical editor of *AU* and network manager for Redwood Publishing. The session will cover developments and Amcom's E-Net alternative to Econet.

SHOW GUIDE

DAY 2. FRIDAY 24 JULY

Business

These sessions are aimed at people familiar with common business packages and wanting to get more out of them.

10.15am – 11.30am.
Wordprocessing in practice
Chaired by *Acorn User* contributor Roger Carus. The sessions will cover *View*, *InterWord* and MS-DOS options, and examine ways of making more effective use of your wordprocessor.

11.45am – 1.00pm.
Database and spreadsheet techniques
Chaired by Graham Bell. The *View* and *Inter* ranges are covered, as well as Minerva's *System Delta* package.

1.00pm – 1.30pm.
Archimedes
Acorn presents the new RISC-based micros. This will be your first chance to see these amazing new machines in action.

2.00pm – 5.45pm.
Programming RISC
Chaired by Graham Bell. The session is aimed at experienced programmers interested in the capabilities of the new machines, and will include talks by software suppliers and demonstrations of their forthcoming products.

DAY 3. SATURDAY 25 JULY

Expert Q&A panels

Panels of *Acorn User* staff and writers will be on hand to answer your questions, with special topics being addressed at specific times. Each topic will take 30 minutes and is followed by a general question and answer session. Topics are:
10.15am – 11.30am Monitors
11.45am – 1.15pm Printers
2.00pm – 3.15pm Discs
3.30pm – 4.45pm ROM/RAM boards

DAY 4. SUNDAY 26 JULY

Special interest panels

10.15am – 11.30am.
Music
Chaired by Steve Mansfield, deputy editor of *Acorn User* and *Educational Computing* magazines. The session will cover MIDI, synthesiser packages and RISC music.

11.45am – 1.00pm.
Publishing
Chaired by Tony Quinn and covering topics like typesetting from disc and desktop publishing packages.

2.00pm – 3.15pm.
Graphics
Chaired by computer artist Jonathan Inglis and covering both painting and computer-aided design packages.

ACORN USER ADVERTISEMENT PAGES – AUGUST 1987

SHOW GUIDE

Pick of the packages

By David Lawrence

For any readers in exile, here is a round-up of software and hardware to look out for at the show. The star will, of course, be the new range of Archimedes RISC machines from Acorn.

As mentioned last month, Electro Music Research (EMR) is dealing with all the music on the Archimedes series, so if you want to hear what the ARM can do, or you want to interface synthesisers to your humble Beeb, then a visit to EMR's stand is essential!

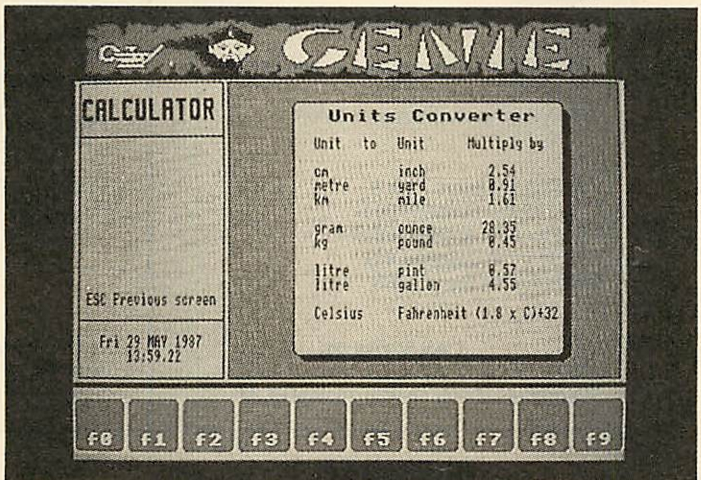
If you want to join Micronet, now is the time to do it. For £66 you'll get a year's subscription, a free modem and software to drive it.

Pineapple has upgraded its CAD package, *Diagram*, and it now utilises sideways and shadow memory. You'll be able to try out the printed circuit designer which features double sided board designing and a full track router.

Superior Software will have all its games on sale, including its latest releases *Grand Prix Construction Set*, *Around the World in 40 Screens* and *Codename Droid: Stryker's Run II.*

Electron owners can now buy a version of *Stryker's Run* for their machine. This is essentially the same as the Beeb version, but has some of the Master's enhanced graphics.

Advanced Memory Systems will be selling its latest mouse for the BBC micro – the same one which is being used as standard on the Archimedes.



***Genie* is one of four 'pop-up' utilities for the BBC micro**

There are no less than four different 'pop-up' utilities for the Beeb. *Genie* from Permanent Memory Systems combines a diary, clock, notepad, address book and calculator that can be called up at the touch of a button (see the review in this issue). *Sideset* from Maze Technology lets you suspend any process and start up a new one in a window. The *Advanced Control Panel* from ACP is a chip-based utility that disables ROMs, catalogues discs, sets up the *CONFIGURE memory for the Master and various other operating system calls. Finally *The Master* ROM from Beebug features utilities for setting up a RAM disc, formatting ADFS discs, a diary and calendar and configuring the CMOS RAM.

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For those who want the *Disc Help Disc* but already subscribe, the disc is available by using the order form on page 130.

YES! Please start my *Acorn User* magazine subscription from the ________ issue and send me my FREE *Disc Help Disc*.

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EDUCATION

NEWS

School modems

BBC Soft's *Modem Master* will enable those schools who have progressed to on-line communications to use their systems more effectively. The package costing £11.26 is entirely disc-based and may be configured for use with a number of different modems and for communication with a wide variety of databases. It includes the facility to auto-dial, with an appropriate modem, but will also allow the user to enter numbers manually.

It allows file transfer in both scrolling and viewdata modes so that telesoftware may be taken from systems such as Prestel or from one of the many bulletin boards, many of which are catalogued in the pack's extensive documentation. XMODEM protocols are supported, enabling error-checking to be done while downloading.

A sideways RAM image is also supplied on the disc. The manual is fairly technical, as it has been designed for those who will set up the system. Once set up, however, there is no reason for a user to refer to the manual, other than when undertaking more complex operations. The package has been designed to hide all the technology behind communications, leaving the user to get on with communicating!

Contact BBC Soft at BBC Enterprises, Wood Lane, London W12 0TT.

The key to datahandling

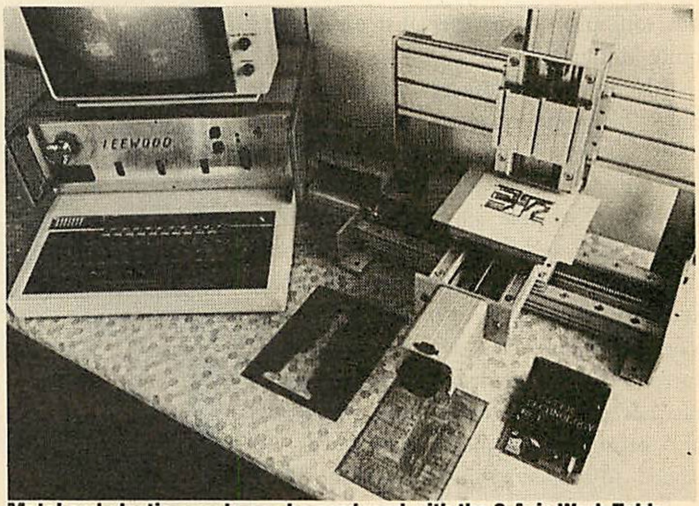
GSN in conjunction with ITV Schools has now released *Key*, its low-cost data-handling package. At £4.95 the package looks set to be bought by most local education authorities. As mentioned in March '87's Education News the IBA intends to provide a variety of datafiles, linked to TV programmes broadcast by its schools service. This is probably where money will be made to finance the development costs of the package, since the datafiles actually cost more than the datahandling package – *British Birds*, which links to the *Animals in Action* programme will cost £15. Some datafiles will be supplied.

GSN explained that *Key* arrived two months later than scheduled 'principally due to including a number of other utilities which teachers and advisers suggested'. On first use the package appears to be extremely fast and easy to use.

The power of this package, other than its speed of operation, lies in the fact that it may be configured to a number of levels of use. Thus it can be integrated effectively into primary and secondary schools.

A supplementary utility disc containing routines for importing files from other databases and ASCII files is available at a cost of £4.50.

Like *Key*, it may be obtained from ITCA at 6 Paul Street, London EC2A 4JH.



Metal and plastic panels can be produced with the 3-Axis Work Table

CAD for XYZ

Leewood Developments' XYZ workstations may now be driven with a wide variety of CAD packages. Using the plotter output from the software, the 3-Axis Work Table may be used in conjunction with a variety of drills and routers. It can produce milled metal and plastic panels, engraving and PCB artwork and has many applications in craft, design and technology. The package is now so flexible that it may even be driven directly by the BBC's MOVE, DRAW and PLOT commands through the RS232 Interface Controller. These commands only need to be scaled appropriately to the motor steps, and sent out with *FX3,7 followed by PRINT "UA 10000 10000" then *FX3,0 which would move the tool 50mm on both.

This powerful package needs to be seen in action to appreciate its accuracy. Leewood exhibited on the same stand as Linear Graphics at this year's Hi Tech show at the Barbican. Many of the ideas for creative plotter software that have come from Linear Graphics are now available in a form which allows them to be transferred to more enduring media than pieces of paper.

Details from Leewood Developments, Leewood Works, Upton, Huntingdon, PE17 5YQ. Tel: (0480) 890860.

New datafile formats

The datafile of educational software including a list of addresses is now available be purchased for £15 in various formats including *ViewStore, Key, Find, Supastore* and *Quest*.

Send your name and, address to Nick Evans, PO Box 55, Grimsby DN32 0QB.

THE SOUND OF MUSIC

Micros can be very informative and helpful in teaching musical theory across the age ranges

Nick Evans

Computer music is associated with tinny sounds and stilted rhythms – music without soul and, to the specialist ear, largely quite 'unmusical'.

Advanced synthesisers allow a wide range of sound qualities to be achieved. These are often made more acceptable to the musical ear as they are reproduced through a sensible amplifier and speaker system. But with BBC machines, the user is left with a tiny speaker through which such delights as *Jesu Joy of Man's Desiring*, *The Entertainer* or Bach's *Fugues* sound forced. The end result is disappointing, not just because of the poor sound quality but also because those pieces were never 'designed' to be played in that fashion – Bach really does sound better on a church organ! Music written especially for electronic instruments is more tolerable, and good examples often accompany arcade games.

When it comes to education, the main issue of debate changes. It is interesting that music making with a computer is one of the few micro applications that is viable both at home and in the classroom.

All of the packages referred to in this article are suitable for home use and some of them have already established themselves in that area. This article discusses the subject of music in the classroom and in the home for all age ranges and across the various modes of use.

Educational packages such as these may be broadly divided into three groups; first directed practice programs, then those for open-minded study and, finally, motivating-type programs.

The directed practice program is designed to teach a specific set of concepts or skills. It has these objectives in mind all the time and usually tries to encourage learners by presenting repetitious material in a more palatable form. It should not be assumed that this type of package is there to replace the teacher. It will probably have been designed by a teacher to help with the management of a demanding class. This type of material reinforces work that the teacher has covered, provides a means for revision and practice and allows the students to develop at their own pace and make their mistakes in private!



Music Master can be played with a recorder

The open-ended package is completely different from the directed practice. It provides a means for self-expression. In this category come packages which encourage the user to compose, to try variations of rhythm and pitch and attempt to create their own musical pieces. The program's job is to take away the technical problems that accompany direct creation of music on a computer.

Finally, the motivating pack is one which encourages an interest in the subject. It often crosses into the directed practice area, but its main intention is to encourage the reluctant learner. As introductions to music for early learners, these packages make an interesting method of instilling basic concepts in the child's mind.

Since the motivating type of package has been defined as a good starting place, it would seem appropriate to look at these in the early years of schooling. Children who are immersed in music at home have little problem when it comes to basic skills such as 'feeling' a rhythm or detecting differences in pitch. Indeed, tests based on these fundamental abilities often determine whether primary school children are allowed an instrument to learn at home. A neat and successful package which endeavours to help in this area is Marion Broadie's *Peter Beater's Music Games*, published through System. The excellent graphics and simple driving method of this pack is a recipe for success. There are two programs on the disc: *Melody Rainbow* and *Musical Jigsaws*. A rainbow represents different pitches and the screen character – Peter Beater – will 'play' the colour, either at random or in response to the keyboard. As the program progresses to a second level, via a menu, you may then choose notes, edit their length and finally listen to the finished composition. The *Musical Jigsaw* section of the program is intended to assess whether the child has taken in the concepts of pitch and duration that were established earlier on. This is achieved by means of Peter Beater pointing at two pictures which are higher, lower or equal to each other on the screen. The pictures are accompanied by sound which matches the position of the picture. Completion of this section is rewarded with a musical picture show. The best thing about this package is that, unlike many of those which are covered in this article, there are plenty of suggestions for further development, ideas for parents to try with their children at home and a simple teaching guide to ensure everything possible is gained from the program.

Jolly Jack Tar from Sherston Software also tackles the topics of pitch and rhythm and dabbles a little with simple music reading. This package is definitely more 'drill and practice' than Peter Beater but nonetheless has a lot to commend it – not least the fact that it is accompanied by a story book in which Jolly Jack the sailor explains the need for conventions of rhythm, pitch, duration and so on.

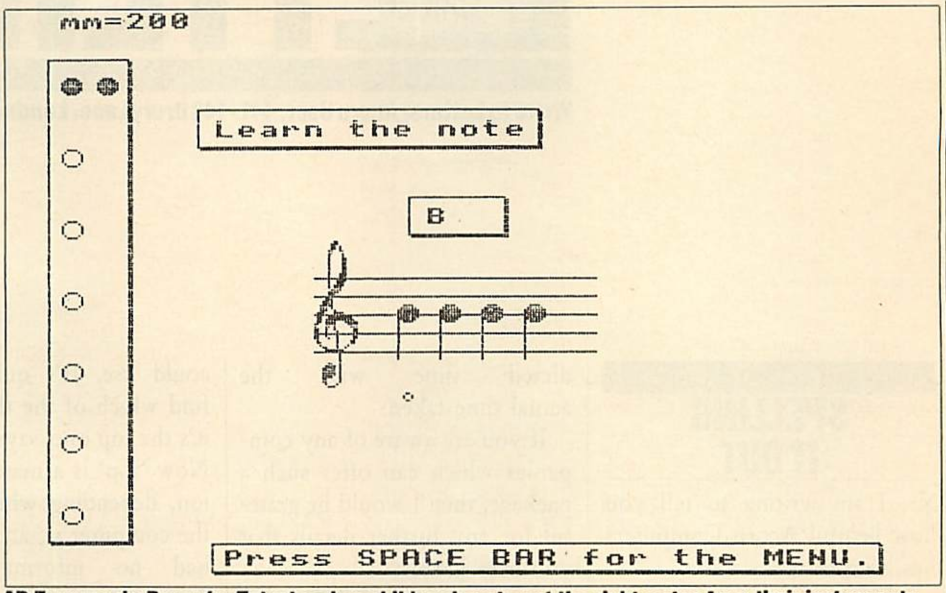
Without any doubt one company has the corner on this market. AB European Marketing recently took over the *Mupados Music* series and added it to its own *Music Master* pack. In the primary and lower secondary age range this series of programs

takes some beating for ingenuity. The *Mupados Recorder Tutor* is designed to help children to practise the more repetitive aspects of recorder work. This pack deals with the mechanics of playing, the position of the fingers and the rhythms of the music. The package subdivides into a number of parts which give tutorial advice. This includes diagrammatic explanation of fingering, and a bouncing ball technique is used to demonstrate the relationship between length of note played and the overall rhythm of the piece. The child may hear the computer play a piece, watch the music on the screen and then play along with the computer. But the real bonus comes in the audio-tape which accompanies the pack. This 'music-minus-one' cassette allows the learner to play along with a fully orchestrated accompaniment. *Mupados* claims the pack provides a complete year's recorder tuition. And to back this up they produced a free video to demonstrate the package featuring Dr Carl Dolmetsch, a famous authority on recorders.

In addition to *Recorder Tutor*, AB European also produces an *Ensemble* pack and a *Duet* pack for recorder work. Its *Micro Maestro Suite* is a further series which adopts a similar approach for keyboards, concert pitch and B-flat instruments. Finally, the ultimate complement to the recorder packages is the Music Master unit. This small box of electronics connects to the user port of the BBC micro; a microphone clips to the recorder. Practising and performance of tunes is then overseen all the while by the computer. A tune can be created and played to the computer, stored and then printed out in musical manuscript form. This is a real spur to creative practice by the children. The package will also allow the computer to be tuned to suit the pitch of the recorder being used.

For those children who have acquired an electronic keyboard and have yet to get to grips with it, the *Keyboard Player* package from Chalksoft provides a way in. It is designed to help the child to practise the relationship between note names and the keyboard and develop basic music-reading skills and understanding.

The creative possibilities of the open-ended packages available for the BBC micro tend to be limited by the fact that you have to use the computer's keyboard in place of a musical keyboard. It is possible to provide add-on keyboards and synthesisers (Music 500/5000 – see *Acorn User* June 1985 and December 1986) but these are beyond the means of most schools. The



AB European's *Recorder Tutor* teaches children how to get the right notes from their instruments

Music System, again from System, is perhaps the most comprehensive of the computer-based musical packages. Interested readers may care to look up the review in *Acorn User*, September 1985. The facility to create music and then print it is a great boon to pupils and teachers alike. And the package also provides a simple way of experimenting with the tonal qualities of the sounds available from the micro. Composition is possible via the *Keyboard* software and you can edit existing compositions too. It is easy to modify existing pieces of music from the Sound Library. Thus a teacher may demonstrate with relative ease the effect that a rock rhythm produces on a Bach composition. As a tool in the classroom for understanding the nature of the computer-produced sound and using it to its best potential, the *Music System* is invaluable.

An interesting and fairly new package is *Music Logo* from Logotron. Lack of familiarity with a music keyboard is not a problem with this software. Sound is built up in stages from notes to phrases to whole melodies. To quote from the handbook: 'Creative music simply means the exploration of sound through the use of appropriate sounding materials or instruments'.

The author sees music as 'sound with structure', and the micro as merely one instrument among a range of 'sound makers' which children employ. The important feature of the package is that it provides a medium in which you can experiment with sounds structure and discover the nature of music. It provides easy access to the BBC micro's sound-making facilities but in such a way that it is necessary to understand the type of sound that is being produced. Knowledge of Logo is helpful and for those schools which already use Logotron Logo this package makes a cheap and interesting extension. It should be emphasised, however, that the package is not intended as a medium for composition or for the production of what might be termed 'formal music'.

The packages that have been covered in this article are only the tip of the iceberg of what is available. The buyer should appreciate the limitations that the micro – any micro – places on the musical output of the user. But software is available that presents the BBC micro's facilities in a usable way and it may be advisable to investigate these simple and informative packages before undertaking investment in more expensive MIDI-linked systems or other add-ons.

Peter Beater's Music Games (£13.00) and Music System (£29.95) are available from System, Collegiate Crescent, Sheffield S10 2BA. Tel: (0742) 682321.

Jolly Jack Tar (£12.00) is available from Sherston Software, 8 Court Street, Sherston, Malmesbury SN16 0LL. Tel: (0666) 840433.

Mupados Recorder Tutor (£26.90). Ensemble Pack (£9.00), Duet Pack (£7.00), Micro Maestro (£15.00), Music Master (£45.90) and the free video are all available from AB European, Wharfdale Road, Pentwyn, Cardiff Wales CF2 7HB. Tel: (0222) 733485.

Keyboard Player (£19.95) is available from Chalksoft, PO Box 49, Spalding PE11 1NZ. Tel: (0775) 69518.

Music Logo (£15.00) is available from Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: (0223) 323656.

LETTERS

Write to Letters, Acorn User, 141-143 Drury Lane, London WC2B 5TF

SPELLING IT OUT

Sir, I am writing to tell you how helpful Acorn Computers has been to me.

I had written to Acorn asking for information concerning the use and suitability of the *ViewSpell* spelling checker in connection with my Master and the ADFS filing system. The company responded with a replacement *ViewSpell* and a covering letter saying that it hoped that this package would sort out my problem.

The problem was that if I tried to make a new dictionary under ADFS, then it would lock up in varying ways, show a blank screen, emit lots of noise from the computer etc.

With the new chip and disc this problem has disappeared. Just shows what Acorn can do when it tries.

S M Kitchener
Hertfordshire

BUSINESS PLANS

Sir, I have a BBC Master computer and am interested in purchasing some business software. I am particularly interested in project planning or time planning packages, whereby a project can be split into individual tasks and their expected times of completion displayed in the form of a bar chart. The package I am looking for should also have facilities for displaying possible conflicts between allotted times for tasks and comparison of predicted time with the actual time taken.

If you are aware of any companies which can offer such a package, then I would be grateful for any further details that you may have.

DJ Woodall
Clwyd

Two companies produce critical path analysis packages for the BBC micro.

Beebplanner **costs £39.95 from E J Sheffield, 8 Langden Close, Camberley, Surrey GU15 1AQ, and** ***CPA*** **costs £57.50 from Unisoft Ltd, PO Box 383, Highgate, London N6 5UP.**

ONE OVER THE EIGHT?

Sir, Some months ago I purchased your *User Dump* ROM and have found it most useful and quite easy to use. My computer is a Master 128 and so I initially used the ROM in a cartridge but recently I decided that the ROM would be best within the computer, as ROM 8. Therefore I reached for my April issue of *Acorn User* and the excellent article in the First Byte series by Tessie Revivis. Incidentally is she for real? I suspect that some of your contributors are either anagrams or speeling errons.

Anyway, armed with the information that there were three available sockets for ROMs in the Master, but two could not be used unless you change the links and lost RAM (why on earth did Acorn do it?), I searched for the one ROM socket I could use. It's quite easy to find which of the three to use, it's the top one, says the article. Now 'top' is a matter of opinion, depending which way up the computer is, and my dealer had no information from Acorn to say which IC number it was. To cut a long story short, it is not the top ROM socket, nor the bottom, it is the one in the middle to get a ROM as ROM 8.

Don Somner
Berkshire

'Top' is indeed a matter of opinion. Tessie meant that socket eight is 'top' because it has a higher priority than the two other sockets, which count as four and five, and six and seven. Tessie Revivis, like all our writers, is indeed a real person, and so letters to all contributors like her are forwarded if sent via our offices – ***Acorn User*****, Redwood Publishing Ltd, 141-143 Drury Lane, London WC2B 5TF.**

PROGRAM PROBLEMS

Sir, I used to have an Electron but now have a Master 128. I have not yet got the *Reference Manual parts 1 and 2*; you would think at £500 you would get these free wouldn't you? Could anyone offer help with a couple of problems?

First, can anyone provide a program to scroll the screen left and right? (I want to store the periodic table and be able to access it.)

Second, can anyone tell me why VDU 22 should not be used from the keyboard in languages such as Basic? I suppose this means you cannot use VDU 22 in PROCs to change mode. What if I did?

Michael G Walton
West Midlands

VDU 22 should not be used because it resets the screen mode – but Basic doesn't notice the change. Using the MODE command properly makes sure Basic knows what memory is being used by the screen. If VDU 22 is used to change the mode, Basic might use screen memory to store some of its variables – so they will be corrupted.

CUTTING THROUGH THE TAPE

Sir, I own a BBC Master and as a former Acorn Electron owner, have a few BBC/Electron games in tape format.

I was looking through the star commands you can use on the Compact when I came across *TAPE. Can you tell me if this means I can use a tape recorder on my Compact?

Steve Peters
West Glamorgan

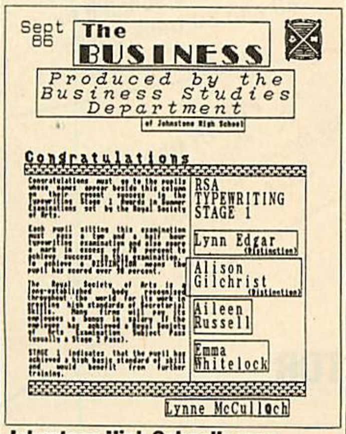
TAPE is included on the Compact for compatibility, but it doesn't actually do anything. Because there isn't a cassette interface on the Compact, programs on tape have to be transferred to disc or via the RS423 link before they can be used. David Atherton's series on the Compact ran in** ***Acorn User **from November 1986 to April 1987.**

BACKING BUSINESS

Sir, I was very interested in your recent article on home publishing.

In the Business Studies Department of Johnstone High School we have been fortunate enough to be able to use *Pagemaker* and *Fleet Street Editor*. I have found that using either of these two packages I can produce much more interesting and attractive class notes as pictures and diagrams can now be easily added to text.

Robert Stevenson
Strathclyde



Johnstone High School's mag

GOOD NEWS FOR NEWS

Sir, I found 'Editing your own' (*AU* June) very interesting and encouraging – so much so that the next edition of our newsletter (York/Selby – a staff newsletter for one division of a social services department) will have quite a few changes.

We used *Inter Word* and *SpellMaster* for the text. Graphics were done with *AMX Super Art* and *Pagemaker* with CJE Micro's *Multifont NLQ*.

The bar charts were prepared with Peter Sandford's bar chart routines from *Acorn User*.

David Ford
Yorkshire



A staff newsletter by *Pagemaker*

KEEP TEACHING THE TABLOIDS

Sir, I write in response to the article 'Editing Your Own' by Tony Quinn in June's special issue on publishing.

I'm a teacher and last autumn, after reading about *Fleet Street Editor* and *Pagemaker*, it seemed to me that desktop publishing was an area of creative media worth investing in. So I bought *AMX Pagemaker* and a mouse and can recommend the program. I've my own BBC Master micro with disc drive, monitor and printer.

Earlier this year I asked some of my classes to write imaginary newspaper stories using lists of words I'd compiled from newspapers like the *Sun* and *Star*. This was the first time pupils had attempted this kind of work. I rewrote and edited their ideas and produced two newspaper frontpages with headlines of 'Siberia!' and 'AIDS claims Hull victim'.

This term, pupils have already looked critically at various teenager magazines (like *Jackie*, *Smash Hits* and *Shoot* among others) with a view to writing and publishing their own magazine during the next half term, so your article was very well timed! I'm currently using it to develop an approach which I hope will enable pupils to achieve a finished product, all of which I'd like to send you if you judge that your readers would be interested.

In addition to teaching media studies I'm in charge of the school's library. Part of this responsibility is to promote library skills. I decided to use desktop publishing to produce teaching notes, a pupil information booklet and two display A3 posters (a map of the library and a newspaper frontpage). Slides and teletext pages complement these. (I wrote a teletext program and 'pages' of information.)

Finally, I wrote a front page about my work!

I've enclosed photocopies of these attempts at publishing for your inspection and would welcome your comments.

Dorian Goring
Humberside

Tony Quinn replies: the publishing special was very well received and apologies to those readers whose letters and magazines we haven't been able to print alongside the ones here.

The most common failing was people trying to do too much and cramming things in. The York/Selby newsletter was clean and simple. For improvements I'd use wider page edge margins, better headlines ('third edition' hardly grabs me) and perhaps paste-in a better headline face. Apart from that it was well-produced, readable, and easy to put together.

'The Business' is a bit fussy – which is the title for example? Also, there are a lot of artwork marks which could have been blotted out with correction fluid.

The Hull papers are amazing. They appear to have been done by sticking four *Pagemaker* pages together and then pasting on the pictures. This can be taken further by using five pages, one of which can be stuck right in the middle of the A3 sheet, so totally disguising any look of it being divided into four.

The text was a bit cramped in places, with captions split off from pictures and stories. If there are a lot of short stories, it's often better to run them together in a column of 'shorts' for simplicity.

A revision of the Hull paper is shown. This was done by physical cut and paste, but could be done in *Pagemaker* with the 'AIDS' headline and the double-column paragraph as the fifth page.

From the point of view of writing, it's a real 'horror' page full of bodies being found, stabbings and kidnaps. There was no good news in it at all – a real pity.



Before and after: Tony Quinn's revised front page appears on the right

FIRST BYTE

DIVIDE AND CONQUER

Although multiplication and division are two of the most complex aspects of assembly, they are in fact easy to grasp

Tessie Revivis

From the outside, it would seem that the most difficult tasks to undertake in machine code are to multiply and divide numbers, but, as with every other aspect of computer programming, with a little thought they can be performed by simplifying the task in hand. For instance, take the multiplication of 7×8. This can be made more straightforward by re-writing it as seven lots of eight added together, ie,

$$7\times8 = 8+8+8+8+8+8+8$$

In both cases the answer is 56. Listing 1 (see page 51) shows how it is done with the variables 'first' and 'second' holding the two numbers to be multiplied.

By resetting the values assigned to 'first' and 'second' the program can be used to multiply any two single-byte values. For larger values two-byte addition should be used and in either case the carry flag should really be checked to see if the result exceeds one or two bytes.

This isn't very elegant and needless to say there is a better way. First we should examine how we would normally multiply two numbers together. Consider the multiplication of 123×231. Let's call the first number the multiplicand, and the second number the multiplier (see Figure 1).

The techniques involved should be familiar to everyone – each digit of the first number is in turn multiplied by each digit in the multiplier such that its least significant digit sits below the corresponding multiplier digit. This results in the shifting of each partial product to the left or right by one digit relative to the previous one. The gap created by this shifting is filled in by a zero. In school, most children are taught to shift the products right, eliminating a zero each time. But shifting left and adding a zero has an equivalent effect, as in Figure 1. When all digits have been multiplied together the resulting partial products are added together to form the result.

To perform this in machine code we need to multiply binary numbers together.

```
  123   (multiplicand)
 x231   (multiplier)
 ----
  123   (first part product)
 3690   (second part product)
24600   (third part product)
 ----
28413   (final product)
```

Figure 1. Decimal multiplication

```
  11   (multiplicand)
 101   (multiplier)
 ---
  11   (first part product)
 000   (second part prodcut)
1100   (third part product)
 ---
1111   (final product)
```

Figure 2. Binary multiplication

Take the numbers 3×5; ignoring leading zeros this is 11×101 in binary. Applying the rules above this multiplication proceeds as shown in Figure 2, remembering that 1×1=1 and 1×0=0.

The final result is 1111, which is &F, or 15 in decimal. If you try working through a few more examples (try 1101×1010 and 1011×1011) you should notice two things. Firstly if the multiplier digit is a zero then the whole of the partial product will be zero – anything multiplied by zero is zero! Secondly if the multiplier is a one then the partial product is simply a copy of the multiplicand but shifted along to the left the correct number of places. Therefore if a zero is present in the multiplier it can be ignored provided we remember to shift the next partial product up to the left by one more position and insert a zero in its least significant bit position. The rule then is this: if the multiplier bit is a one, then the multiplicand can be added to a running total. If the multiplier is a zero, then simply ignore the multiplicand but rotate all the bits one position along and drop in a zero on the right.

Rotation command

Now wouldn't it be nice if there was a rotation command in the 6502 instruction set. Well there is a whole selection. The first is the ROR instruction which stands for ROtate Right. It can be used on the accumulator (ROR A) on a memory location (ROR memory).

The ROR instruction in fact is a nine-bit rotation using the carry flag bit as its ninth bit. Figure 3 illustrates how the instruction works showing the contents of the accumulator (or memory location) before and after the instruction has been used.

The ROR instruction must be used with another bit shifting instruction to perform this multiplication effectively – the Logical Shift Right (LSR) instruction. This performs in much the same way as ROR, except that the carry flag bit is not used. Bit seven of the byte being LSRed moves into the carry flag or before, but a zero is placed into the vacated bit seven.

Figure 4 (see page 50) illustrates the pre and post-LSR effect. If you look at the figure carefully and apply it to few binary numbers of your own you may notice that it effectively halves the value of the byte.

Listing 2 uses the ROR instruction in both its accumulator and memory addressing mode. It takes two one-byte numbers and multiplies the two together providing the result in two bytes.

Let's examine how the program works in a bit more detail. As we are multiplying two single-byte numbers we have to multiply eight bits. We keep track of these in the X register which is therefore loaded with eight and is the bit counter. The accumulator is cleared to ensure that there are no surplus bits that may get added and corrupt the result. Remember, unlike the worked examples above we are not forming and storing partial products for adding on completion, but instead keeping a running total of each partial product as we progress through the bits of the multiplier. This makes the

program slightly quicker to complete and saves on memory that would be required to save each partial product.

Loop

The main program loop is marked by the label 'loop'. The 'LSR second' instruction moves the first bit (bit 0) of the multiplier into the carry flag (see Figure 4) and sets it accordingly. The carry flag can then be tested to see if it contains a one or a zero. If it holds a zero, the flag will be clear, and the BCC instruction will jump over the next few bytes of code (to the 'clear' label). This code adds the multiplicand to the running partial product total held in 'result'. Remember if the carry flag is clear then there is no need to add the multiplicand. If on the other hand, the carry flag is set, it must be added. The next requirement is to shuffle the bits along by one bit position using the ROR instruction, to ensure that the 'weight' of the multiplicand is correct for the bit it is to be multiplied with next. Finally, the X register is decremented by one. The loop repeats until all eight bits of the multiplier have been processed.

If after studying the program you are still struggling to grasp exactly what is happening, first make sure that you fully understand how the ROR and LSR instructions work, and then using two small numbers (say four bits each, ie, 1101 and 1001) try to work out what each instruction is doing and the bit pattern of each register after each instruction has been executed. Then all will become clear!

Division

Having discussed multiplication, we must look at its counterpart – division. As with multiplication, let's try to simplify the division process. What we are really doing is calculating the number of times the second number (the divisor) can be subtracted from the first (which is called the dividend). Take for example of 48/4. Here four can be subtracted from 48 12 times with no remainder. In binary, 48 is 00110000 and 12 is 1100 so the long division calculation becomes:

```
             1010    (Quotient)
          ________
0100     )00110000   (Dividend)
            0100
             0100
             0100
             0000    (Remainder)
```

Dividing binary numbers is easy, as it follows the same simple rules that can be applied to multiplication, except they are reversed. The rules are that if the divisor is equal to or is less than the dividend then a one must be placed in the quotient. On the other hand, remember that if the divisor is greater than the dividend, a zero must be placed in the quotient.

As with multiplication, we can test the bit to see if it's a one, in which case the subtraction can go ahead. If the bit is a zero, then it can be ignored, and the partial quotient shifted along. Then the next bit can be brought down and the process repeated. The shifts in this case must be in the reverse order, as we work from the high-bit down to the low-bit in a division. The ROR and LSR instructions have their counterparts and these are ROL (ROtate Left) and ASL (Arithmetic Shift Left). Figures 5 and 6 illustrate that these instructions do work in a similar way, but in the opposite direction to each other.

As with the multiplication program the X register is used to keep a count of the number of bits being shifted. The first action of the program inside the main loop is to shift the dividend left one bit to move

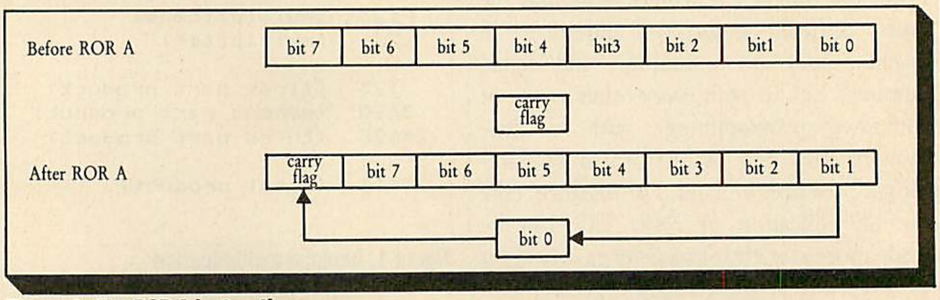


Figure 3. The ROR A instruction

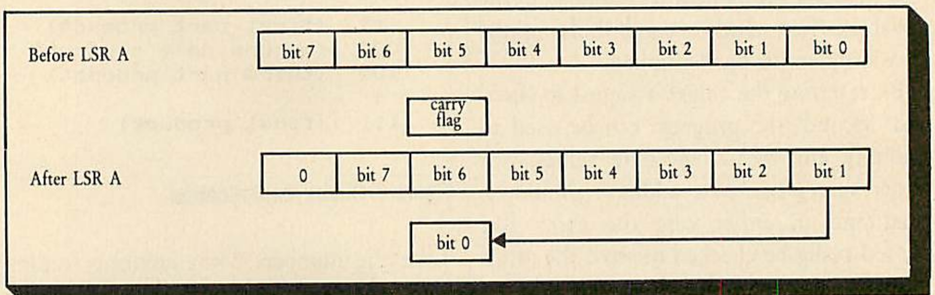


Figure 4. The LSR instruction

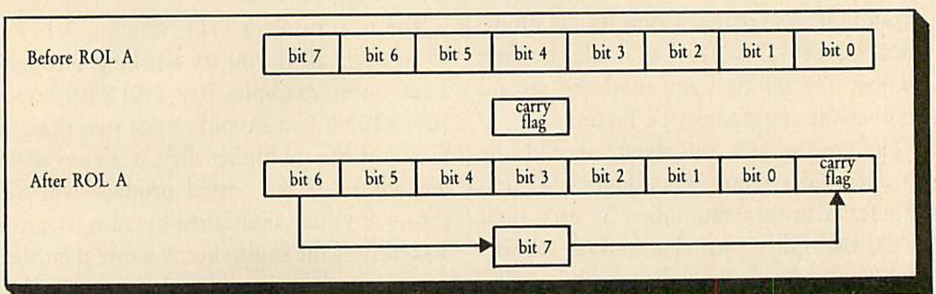


Figure 5. The ROL A instruction

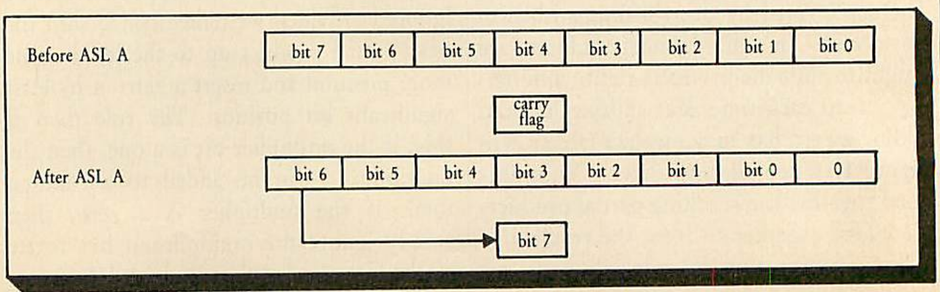


Figure 6. The ASL instruction

the least significant bit on and insert a zero in its position. The bit (which is now in the carry flag position) is rotated on into bit zero of the accumulator. The byte in the accumulator is then compared to see if the divisor is less than or equal to the partial dividend. If the divisor is greater, then it is not subtracted as the BCC is executed. Otherwise the divisor is subtracted and a one is added to the quotient.

Finally the X register is decremented, and if there are more bits to process, the loop repeats until the calcualtion is complete. Any remainder is saved before the program is finally exited.

Improvement

Finally, you can improve the program by adding some error checking to it. For example a division by zero is not allowed, and this could be checked for by loading the divisor into the accumulator at the very start of the machine code and testing the zero flag. Add the lines in listing 4 to listing 3 to perform this divide-by zero check.

Both the multiplication and division programs require input from you. The multipliers and divisors have to be put into the zero page locations, and this is done in PROCgetnumber. However, they can easily be integrated into your own assembler programs. All that you need to do is to ensure that the numbers to be multiplied or divided are deposited into the correct memory locations before using the routines then go ahead as before.

Listing 1. Simple multiplication

```
   10 REM Simple Multipl
ication
   20 REM by Tessie Revi
vis
   30 REM for B/B+/E/M/C
   40 REM (c) Acorn User
 August 1987
   50 :
   60 DIM code% 256
   70 first=7:second=8:r
esult=&70
   80 P%=code%
   90 [.simple
  100 LDA #0
  110 STA result
  120 LDX #second
  130 CLC
  140 .loop
  150 LDA result
  160 ADC #first
  170 STA result
  180 DEX
  190 BNE loop
  200 RTS
  210 ]
  220 CALL simple
  230 PRINT first;"x";se
cond;"=";?result
  240 END
```

Listing 2. Single-byte multiplication

```
   10 REM Single byte mu
ltiplication
   20 REM by Tessie Revi
vis
   30 REM for B/B+/E/M/C
   40 REM (c) Acorn User
 August 1987
   50 :
   60 DIM code% 256
   70 first=&70:second=&
71
   80 result=&72
   90 PROCassemble
  100 PROCgetnumbers
  110 CALL multiply
  120 PRINT "Result is:
";!result AND &FFFF
```

Continued ▶

◀ Listing 2 continued

```
  130 END
  140 :
  150 DEF PROCassemble
  160 FOR pass=0 TO 3 ST
EP 3
  170 P%=code%
  180 [OPT pass
  190 .multiply
  200 LDA #0
  210 LDX #8
  220 .loop
  230 LSR second
  240 BCC clear
  250 CLC
  260 ADC first
  270 .clear
  280 ROR A
  290 ROR result
  300 DEX
  310 BNE loop
  320 STA result+1
  330 RTS
  340 ]:NEXT
  350 ENDPROC
  360 :
  370 DEF PROCgetnumbers
  380 CLS
  390 INPUT "Multiplican
d: "mulpcnd
  400 INPUT "Multiplier
 : "mulply
  410 ?first=mulpcnd:?se
cond=mulply
  420 ENDPROC
```

Listing 3. Single-byte division

```
   10 REM Single byte di
vision
   20 REM by Tessie Revi
vis
   30 REM for B/B+/E/M/C
   40 REM (c) Acorn User
 August 1987
   50 :
   60 DIM code% 256
   70 first=&70:second=&
71
   80 remaind=&72
   90 PROCassemble
```

Continued ▶

◀ Listing 3 continued

```
  100 PROCgetnumbers
  110 CALL divide
  120 PRINT "Result is:
";?second
  130 PRINT "Remainder:"
;?remaind
  140 END
  150 :
  160 DEF PROCassemble
  170 FOR pass=0 TO 3 ST
EP 3
  180 P%=code%
  190 [OPT pass
  200 .divide
  210 LDA #0
  220 LDX #8
  230 .loop
  240 ASL first
  250 ROL A
  260 CMP second
  270 BCC nosub
  280 SBC second
  290 INC first
  300 .nosub
  310 DEX
  320 BNE loop
  330 STA remaind
  340 RTS
  350 ]:NEXT
  360 ENDPROC
  370 :
  380 DEF PROCgetnumbers
  390 CLS
  400 INPUT "Dividend: "
divd
  410 INPUT "Divisor : "
dsor
  420 ?first=divd:?secon
d=dsor
  430 ENDPROC
```

Listing 4. Additional lines for listing 3

```
  202 LDA second
  204 BEQ zero
  342 .zero
  343 BRK
  344 ]
  345 $P%=" Division by Zero"
  346 P%=P%+LEN($P%)
  347 [OPT pass
  348 BRK
```

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The Lever Brothers Educational Unit has produced a versatile new product called appropriately enough, Soap. Mind you it's not the soap for which we're famous, it's a software product for which we hope to become equally famous.

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ACORN FORUM

David Atherton presents readers' ideas on VDU commands, second processors, compression and more

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GREAT COMPRESSION

Regular contributor Jonathan Temple has been looking at the text compression article in the February 1984 issue of *Acorn User*, and set out to see whether he could improve on the 75 per cent of original length, achieved then. He has now sent us a simple yet effective text compression routine (listing 1 in the yellow pages), which, he claims, can usually achieve 60 per cent compression. I tried it and that figure seems to be accurate.

His system achieves high compression ratings without the need for dictionaries of common words. It works by using the concept of nibbles or half-bytes. The routine's output operation is basically similar to that described on page 102 of the February 1984 issue of *Acorn User*, and works like this:

READ the next nibble (four bits)

IF nibble is less than 13

THEN output one of the 13 most common characters (etaoinshrdlu)

ELSE READ another nibble: output one of 48 remaining characters.

This is the decompression algorithm, and is performed by FNdecomp (M) where M is the address in memory of the compressed string.. The compression is done using PROCcomp (M,N) where M is the address of the string to be compressed, and N the address for the new string to be stored. The compression routine is written so that it is possible for M and N to be the same address. PROCinit must be used first.

At present, the numbers 0 to 9 and some punctuation cannot be used in strings for compression. If required, then several more 16-character strings in the C$ array could be created and the existing ones changed; this would entail changing PROCinit, as well as those lines where S% is reset.

To make modifications easier, figure 1 shows how the four strings are linked by the compression routine.

As it stands, the program is really a demonstration of an algorithm and a technique. It needs to be translated into machine code to have practical benefit. So go to it and find some practical use for the idea in your programming.

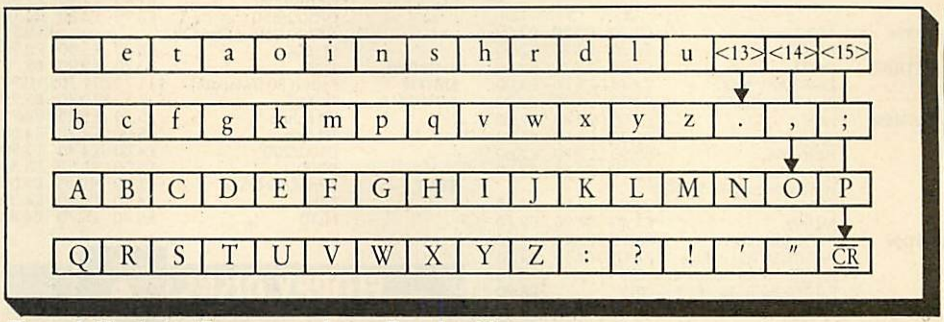


Figure 1. Illustrates the compression coding algorithm

STRINGING ALONG

To enter quote marks into a string, you must type two quote marks for each mark you wish to appear, so if you wanted to program key 0 with LOAD "PROG", the command is:

```
*KEY 0 "LOAD ""PROG"" "
```

It's very easy to lose track of how many quotes to use. Did you know that for operating system commands the sequence |" can also be used? In the above example the command would be:

```
*KEY 0 "LOAD |"PROG|" "
```

or alternatively:

```
*KEY 0 LOAD |"PROG|"
```

which show a little more clearly which quotes are which. This technique does not apply to BBC Basic, where the double quotes system must be used.

£10

EXTENDED PLOT VECTORS

Next is a piece from Alistair Shimmin of Crowthorne, on creating your own VDU commands. Alistair has provided a simple example of a new VDU 23 command, which prints out the character definitions.

The program in listing 2 (see yellow pages) is doubly interesting because it is one technique for legally accessing the 12k of private RAM on the Master and Compact, and more importantly because it illustrates the use of an extended vector.

The 12k of MOS private RAM on the Master (not to be confused with the 16k banks that the *SR commands use) is known in internal Acorn documents as ANDY, and is usually paged out, as locations &8000 to &C000 are given to the currently active ROM. If you want, say, to read character definitions then this poses a problem. The same goes with implementing your own graphics commands which have to work in shadow modes.

Fortunately, Acorn has allowed a legal means of access to all of the MOS sideways RAM and shadow screens by use of the extended plot code vector which is at locations &226 and &227.

To use the vector you can either issue a VDU 23, X call (where X is between 28 and 31), or VDU 25, X (where X is greater than 239). In general, you would use VDU 25 for graphics routines and VDU 23 for other functions. The program to display character definitions will use VDU 23.

The routine Alistair has written is entered by a VDU 23, 28, a, b | command, where 'a' is the first character to be displayed and 'b' is the last. The number of definitions must not be greater than 32.

On entry to the extended plot code vector, the carry flag is set if a VDU 23 command was issued, or clear if it was a VDU 25. The value immediately after the VDU 23 or 25 is contained in the accumulator. The program thus checks that carry is set and the accumulator contains 28.

The next step is to gain access to the other VDU 23 parameters. These are all found at offset &1B from the VDU variable base address, which is &300 on all machines. So when the command VDU 23, 28, a, b | is issued, 28 will be at &31B (as well as in the accumulator) 'a' will be at &31C, 'b' at &31D and so on.

The rest of the routine works on the basis that the definition for SPACE (character 32) is at &8900,! (character 33) is at &8908 and so on. The extended plot routine finishes with a RTS.

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PRESERVING VARIABLES

Here's a very useful program (listing 3) from Simon Reading to preserve Basic variables when Break is pressed. Often when you are writing code, or typing in a listing, the program doesn't perform properly, and you want to look at the values of the Basic variables. But if you've disabled the Escape key, or used an ON ERROR routine, then you can't always get out. Simon's program solves this problem. Run the program once before you load in or type in your program, and then when you press Break any defined variables will be preserved and can be printed out by typing in PRINT commands, or alternatively by using a toolkit program.

The program, which resides at &900 in memory, works by holding a buffer in RAM into which the variable table is copied. When Break is pressed, the operating system jumps to the address set up by *FX247, 248 and 249, and executes code there before it does anything else. The code that it used copies all the variables and zero page pointers into the safe area of the RAM buffer.

To complete the process, *KEY10 is programmed with a call to the second part of the program. The string on *KEY10 is activated after the operating system has restarted, and thus the second part of the program can safely restore the variable data and pointers.

The program won't preserve variables over a CTRL-Break, because this clears the *KEY10 definition.

```
   10 REM Preserve varia
bles over BREAK
   20 REM by Simon Readi
ng
   30 REM for B/E/B+/M/C
   40 REM (c) Acorn User
 Aug 87
   50 :
   60 CLS
   70 start=&900
   80 buf=start+&43
   90 FOR A=0 TO 3 STEP3
  100 P%=start
  110 [OPTA
  120 BCS rts
  130 LDX #0
  140 .loop
  150 LDA &480,X
  160 STA buf,X
```

Continued ▶

```
  170 INX
  180 CPX #&4F5-&480
  190 BNE loop
  200 LDX#0
  210 .loopK
  220 LDA 0,X
  230 STA buf+120,X
  240 INX
  250 CPX #&19
  260 BNE loopK
  270 RTS
  280 .rts
  290 RTS
  300 LDX #0
  310 .loop2
  320 LDA buf,X
  330 STA &480,X
  340 INX
  350 CPX #&4F5-&480
  360 BNE loop2
  370 LDX #0
  380 .loopL
  390 LDA buf+120,X
  400 STA 0,X
  410 INX
  420 CPX #&19
  430 BNE loopL
  440 LDA #0
  450 STA &A
  460 STA &B
  470 LDA #7
  480 STA &C
  490 RTS
  500 ]
  510 NEXT
  520 byte=0
  530 FOR A=start TO P%-
1
  540 byte=byte+?A
  550 NEXT
  560 *FX247
  570 *FX18
  580 IF byte<>8013 PRIN
T"Checksum error - check
 listing":END
  590 *FX18
  600 DIM C 50
  610 X%=C AND &FF
  620 Y%=C DIV &100
  630 $C="KEY10 CALL&"+S
TR$~(rts+1)+"|MOLD|MCALL
&"+STR$~(rts+1)+"|M"
  640 CALL&FFF7
  650 Y%=0
  660 A%=247:X%=76:CALL&
FFF4
  670 A%=248:X%=start AN
D &FF:CALL&FFF4
  680 A%=249:X%=start DI
V &100:CALL&FFF4
  690 PRINT"Routine inst
alled at &";~start
```

Listing 3. Preserving Basic variables

£10

WHICH PROCESSOR?

David Spencer has been looking at the 6502 processor family. As you probably know, the 65SC12 micro processor fitted to the Master series computers contains some instructions such as PHX (PusH X) and INC A (INCrement A), which are not available on the standard 6502 used in Model Bs. In addition some 6502 second processors (although not all, we were warned by Acorn) use a processor made by Rockwell called the R65C02, which has all the instructions of the 65SC12 plus a few more such as RMB (Reset Memory Bit) and BBS (Branch Bit Set). Early 6502 second processors use a 65SC02 and Turbo coprocessors use the 65SC102. Both have the same instruction set as the 65SC12.

There are several cases where it is important to know exactly what processor a piece of code is running on. For example, a disassembler needs to know whether to treat the opcode pattern &1A as INC A (65SC12 and R65C02) or as an illegal instruction (6502). A program written using the new opcodes should be able to detect if the wrong processor is being used and report an error.

One roundabout way of detecting the processor is to read the MOS type using OSBYTE with A=0 or INKEY−256, but what if this is a second processor on a model B, or if somebody has bought an R65C02 and put it in a model B? Then a way is needed to determine directly the processor in use. The obvious way is to try executing the new instructions and seeing if they have worked or not, but this causes problems because some of the new opcodes will crash a normal 6502 or have some other undesirable effect. Worse still, not all 6502s appear to behave in the same way for undefined opcodes. The solution is to try various instructions carefully until a suitable one is found. This is exactly what David did, and came up with a neat program (listing 4 on the yellow pages) which I have tested on various micros.

The program first tries DEC A, to weed out the plain 6502s. If the accumulator has not been decremented, the jump to 'cmos' doesn't happen and '6502' is reported. Then the Rockwell-only instruction SMB 6,&70 is tried, which should set bit 6 of location &70 (without affecting anything else). Masking is used to get bit 6.

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BBC Publications rom for enhanced Teletext Utilities. £7.95 (d)

WINCHESTER DRIVES

P20HD TECHNOMATIC 20 Mbyte Winchester Drive £529 (a)

P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM £859 (a)

P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom. £769 (a)

P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom. £1295 (a)

TS10 10 Mbyte Tape Streamer Backup unit with utilities. £599 (a)

TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10. £19 (d)

Special adaptor for S.J. File Server £28 (d)

Enquire for larger capacity Winchesters.
These Winchesters are compatible with the S.J. File Server.

WINCHESTER Drive Multiplexer
- TWM2 for two computers. £99 (b)
- TWM4 for four Computers. £159 (b)

SECOND PROCESSORS

Universal 2nd Processor Adaptor £75 (b)
TORCH ZEP100 £229 (a)
MULTIFORM Z80
TECHNOMATICs multi format Z80 system includes a FREE Pocket Wordstar + MS/DOS Read/Write Utility £289 (b)

ACORN IEEE INTERFACE

Allows BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard. The interface can link upto 14 compatible devices. Typical applications are in experimental work in academic and industrial labs. £265 (a)

PRINTERS

EPSON LX800
150 cps, variety of fonts, including NLQ, bit image graphics, IBM char/graphics compatible, centronics interface and tractor feed as standard £229 (a)

EPSON FX800
An enhanced version of FX85. Call for details. £329 (a)

EPSON FX1000
An enhanced version of FX105. Call for details. £449 (a)

EPSON EX800 £409 (a)
Colour option for EX800/EX1000. £59 (b)

EPSON LQ800 £439 (a)

EPSON LQ1000
As LQ800 but wider carriage for 136 columns. £589 (a)

TAXAN KP815
Enhanced KP810 with 160cps and full IBM compatibility. £269 (a)

TAXAN KP915
Enhanced KP910 with 180cps and full IBM compatibility. £369 (a)

NATIONAL PANASONIC KX P1081 £159 (a)
STAR NL 10 (Parallel Interface) £209 (a)
STAR NL 10 (Serial Interface) £279 (a)

INTEGREX Multicolour Inkjet printer. £549 (a)
Ideally suited for high res colour VDU screen dumps. Quiteness & consistent output are major characteristics. £525 (a)
BBC Screen dump for Integrex. £15 (d)

BROTHER HR20
A new attractively styled printer from Brother with unusually quiet operation, host of new fatures, including option to copy current documents. 8K buffer standard expandable to 16K. Parallel & Serial ports as standard. £349 (a)

NAT PANASONIC KX P3131
Daisy wheel printer with 38K buffer, 17 cps, bi-directional, parallel interface £249 (a)

JUKI 6100 Daisy wheel printer
15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface. £319 (a)

PLOTTERS

HITACHI 672 £495 (a)

LINEAR GRAPHICS
Full range of accessories available for plotmate plotters
- **A4S PLOTMATE** £370 (a)
- **A4SM PLOTMATE** £450 (a)
- **A3M PLOTMATE** £569 (a)

(Enquire re educational prices for the Linear Graphics plotters)

Parallel Printer Lead (1.2m). £6 (d)
Serial Printer Lead (1.2m). £7 (d)

PRINTER SHARERS & BUFFERS

BUFFALO PB Buffer
Parallel buffer for internal fitting to most Epson printers. Simple to instal.
PB128 (128K) £90 (c)

PERIPHERAL & COMPUTER SHARERS
High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases. all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£45(c)	25v25-2	£45(c)
3 Computers to 1 Printer 36v36-3	£69(c)	25v25-3	£65(c)
4 Computers to 1 Printer 36v36-4	£85(c)	25v25-4	£75(c)
2 Computers 2 Printers X-over 36v36-x	£69(c)	25v25-x	£65(c)
BBC Cable set 3 to 1 (1m ea)	£32(d)		£34(c)
BBC Cable set 4 to 1 (1m ea)	£39(d)		£41(c)

BBC Computer Sharer: TCS26
1 computer to 2 printers fitted with BBC cable £22 (c)

Paper & Labels
Plain fanfold paper with microperforation:
- 2000 sheets 9½ × 11" £12 (£3.50)
- 2000 sheets 14½ × 11" £18.50 (£4.50)
- 1500 sheets A4 90gsm £18.00 (£4.00)

Labels/1000
- Single Row 3½ × 1 7/16" £5 (d)
- Triple Row 2 7/16" × 1 7/16" £5 (d)

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(24 hr viewdata system)
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Telex:922800

RETAIL SHOPS
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Tel:01-208 1177 Telex:922800
(close to Dollis Hill ⊖)
West End Branch
305 Edgware Road, London W2
Tel:01-723 0233
(near Edgware Road ⊖)

For fast delivery telephone your order on 01-208 1177 using VISA/Acess Card

BARCLAYCARD VISA | Access

Orders welcome from government depts & educational establishments

All prices ex VAT. Prices are subject to change without notice
Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

DISC DRIVES

All floppy drives carry a two year warranty

5.25" Single Drives 40/80 switchable:

TS400 400K/640K	£114 (b)
PS400 400K/640K with integral mains power supply	£129 (b)

5.25" Dual Drives 40/80 switchable:

TD800 800K/128OK	£199 (a)
PD800 800K/1280K with integral mains power supply	£229 (a)
PD800P 800K/1280K with integral mainspower supply and monitor stand	£249 (a)

3.5" 80T DS Drives:

TS351 single 400K/640K OFFER	£75 (b)
PS351 single 400K/640K with integral mains power supply	£119 (b)
TD352 Dual 800K/1280K	£135 (b)
PD352 Dual 800K/1280K with integral mains power supply	£187 (b)
PD853 Combo Dual 5.25"/3.5" drive with psu.	£229 (a)

DISC DRIVE MULTIPLEXER

TDM2 Dual Unit: 2 computers/one drive unit	£75 (b)
TDM4 Quad Unit: 4 computers/one drive unit	£135 (b)

3M FLOPPY DISCS

5.25" Discs in packs of 10

744 40T SS DD	£10.00 (d)
745 40T DS DD	£12.00 (d)
746 80T SS DD	£14.50 (d)
747 80T DS DD	£15.50 (d)

(Add £1 for library case packing)

3.5" Discs in packs of 10

80T SS DD	£20 (d)
80T DS DD	£25 (d)

BULK DISCS

High quality unlabelled discs supplied in packs of 50 in a storage box. The 5.25" discs have the reinforcing hub rings. These discs are guaranteed for life.

50 5.25" 40 T single sided discs in lockable box.	£35 (b)
50 5.25" 80T double sided discs in lockable box.	£45 (b)
50 3.5" 80T double sided discs in lockable box.	£95 (b)

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs	£12.50 (d)
3.5" Kit with 20 disposable discs	£14.00 (d)

DISC STORAGE BOXES

DB340 Lockable 40 x 3.5"	£8.50 (c)
DB550 Lockable 50 x 5.25"	£9.00 (c)
DB570 Lockable 70 x 5.25"	£11.00 (c)
DB5100 Lockable 100 x 5.25"	£13.00 (c)

MONITORS

BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors
Please specify plastic or metal case.

Microvitec 1431 Standard Resolution 453 pixels	£179 (a)
Microvitec 1431AP As 1431 + composite video and sound input	£199 (a)
Microvitec 1451 Medium Resolution 653 pixels	£225 (a)
Microvitec 1451AP As 1451 + composite video and sound input	£259 (a)
Microvitec 1441 High Resolution 895 pixels	£365 (a)

Microvitec 20" RGB/PAL/ Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	£380 (a)
Microvitec 2040CS High Resolution RGB/Comp Video	£685 (a)
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	£239 (b)
TAXAN SUPER VISION 620 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£279 (a)
TAXAN SUPER VISION 625 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£329 (a)
MITSUBISHI XC1404 14" Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible	£219 (a)

12" MONOCHROME MONITORS

TAXAN KX 117 Hi Res green etched screen	£85 (a)
TAXAN KX 118 Hi Res Long Persistence (P39)	£95 (a)
TAXAN KX 119 Hi Res amber etched screen	£95 (a)
PHILIPS BM 7502 Hi Res green screen. Supplied with swivel stand	£75 (a)
PHILIPS BM7522 Hi Res amber screen. Supplied with swivel stand	£79 (a)
PHILIPS BM 7542 Hi Res White screen. Supplied with swivel stand	£79 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£20 (c)
Philips Swivel Base	£14 (c)
Monitor Stand Models B & B+	£10 (c)
Monitor Stand Master	£13 (c)
Double Tier stand Models B, B+ or Master	£24 (b)
Taxan RGB Lead	£5 (d)
Microvitec Lead	£3.50 (d)
Monochrome BNC/Phono Lead	£3.50 (d)

EPROMS/RAMS

2764-25
27128-25
6264LP-15
27256
27512

} **all prices on application**

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams	£37 (c)
ATPL Battery backup kit	£16 (d)
ATPL Board for BBC+ (now in stock).	£31 (c)

TIME WARP

Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	£31 (d)
Time Warp with PANOS Utilities.	£39 (d)

MODEMS

All modems listed below will be supplied with BBC Publications ModemMaster comms package and a BBC data lead.

MIRACLE WS2000V21/23 & BELL stds	£92 (c)
WS2000 Auto Dial Card	£27 (d)
WS2000 Auto Answer Card	£27 (d)
WS2000 SK1 Kit	£5 (d)
WS2000 User Port Lead	£5 (d)
MIRACLE WS4000 V21/23	£135 (b)
MIRACLE WS3000 V21/23	£265 (b)
MIRACLE WS3000 V22	£445 (b)
MIRACLE WS3000 V22 bis	£585 (b)

(All modems are BABT approved)

BBC Data Cable for WS3000/4000	£7 (d)

PROGRAMMING ACCESSORIES/SOFTWARE

See page 5 for detailed specification

Compatible with B, B+ and Master

EpromRyter (Epromer II) Eprom Ryter is compatible with BBC Master only	£119 (b)
Upgrade of Epromer II to Eprom Ryter	£49 (b)
EPROMER II	£89 (b)
MPROMER	£49 (c)
META ASSEMBLER	£145 (b)
PORTAL EPROM EMULATOR 512K	£245(b)
TEAM Disassembler	£145 (b)

EPROM ERASERS

UV1B 6 eproms, safety cutout	£47 (b)
UV1T 6 eproms, timer, safety cutout	£59 (b)

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

CAD/DRAWING PACKAGES

NovaCad Cad Package for B, B+ & MASTER. (See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£79 (d)
TM Version plus Tracker Ball	£119 (c)
TM Version plus Mouse	£105 (c)
Plotter Driver Generator	£25 (d)

MOUSE

AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£63 (d)
PAGEMAKER	£39 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£21 (d)
MAX	£17.35 (d)
STAND ALONE MOUSE (includes horizontal scroll lock)	£34 (c)

RB2 TRACKER BALL

RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR incl VAT	£39.50 (d)

CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional	£310 (a)
ASHTON TATE's DBASE II	£310 (a)
SUPERCALC II	£195 (a)

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

*All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** comment on their use with other DFS systems.*

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£41 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)

WORD PROCESSORS

VIEW 2.1	£37 (d)
VIEW 3.0	£56 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£7 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS	£21 (d)
SPELLMASTER	£49 (d)
INTERWORD (If you own a WW+ then quote your reg number and pay £39).	£46 (d)
WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET	£41 (d)
WINDOWMATIC	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£39 (d)
INTERCHART	£27 (d)
ULTRACALC	£52 (d)
MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	£14.75 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version	
For Master, Compact, B+ & B	£48 (c)

LANGUAGES

META ASSEMBLER	£145 (b)
TEAM DISASSEMBLER	
MACROM	£33 (d)
ACORN MICRO PROLOG	£62 (d)
ISO-PASCAL	£51 (c)
ISO-PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL (40 or 80T) Specify B or B+	£36 (d)
OXFORD PASCAL for Master	£52 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£43 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT	£52 (c)
MICROTEXT PLUS	£229 (b)

COMMUNICATIONS

TERMULATOR	£25 (d)
COMMSTAR II	£28 (d)
COMMUNICATOR	£49 (d)
MODEM MASTER	£11 (d)
COMMAND (Specify modem type)	£34 (d)
MASTER TERMULATOR	£34.75 (d)

COMPACT (all on 3½" disc)

ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
RAMROD	£37 (d)
BROM PLUS	£32 (d)
MACROM	£37 (d)
BETABASE	£27 (d)
WHITE KNIGHT MKII	£16 (d)
BBC PUBLICATIONS BUNDLED SOFTWARE	£18.50 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£24 (d)
MONITOR (BBC Pub)	£34 (a)
BROM PLUS	£26.50 (d)
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual	£9.50 (d)
Cassette	£9 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£24(d)
PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
DUMPMASTER	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY		£11 (d)
COMPUTERS AT WORK	Aud/EC/disc	£16 (c)
PICTURE CRAFT	Disc	£17 (d)
INTRODUCING GEOGRAPHY	Disc	£16 (d)
MATHS WITH A STORY 1	Cass	£8 (d)
MATHS WITH A STORY 2	Cass	£8 (d)
NUMBER GAMES	Cass/EC	£7.50 (d)
USING YOUR COMPUTER	Cass	£24 (c)

SECONDARY LEARNING

TECHNOLOGY & DESIGN Pt1		£21.50 (c)
ELECTRIC FIELDS		£10.50 (d)
ADVANCED LEVEL STUDIES: STATISITICS	Disc	£23 (d)
ADVANCED STUDIES: GEOGRAPHY	Cass	£10 (d)
INSIDE INFORMATION	Prog Cass	£10 (d)
	Audio Cass	£5 (d)
	Book	£8 (d)
SCIENCE TOPICS (ST)		
S.T.:WAVES	Disc	£14 (d)
S.T.:RELATIONSHIPS	Disc	£14 (d)
S.T.:BONDING	Disc	£14 (d)
S.T.:ELECTROMAGNETIC SPECTRUM	Disc	£14 (d)
S.T.:ELECTRONICS IN ACTION	Disc	£14 (d)
S.T.:NEWTON & THE SHUTTLE	Disc	£19 (d)
S.T.:ECOLOGY	Disc/EC	£19 (d)
S.T.:POLYMERS	Disc/EC	£19 (d)
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc	£20 (d)
S.T.:FOOD & POPULATION	Disc	£20 (d)
SEC.SCIENCE MICROTECHNOLOGY	Cass	£7 (d)
SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC	£16 (c)

GENERAL

VU-TYPE PROFESSIONAL	Disc	£19 (d)
WHITE KNIGHT MK II (for compact)	Disc	£16 (d)
BATTLEFIELDS	Cass	£8.50 (d)
A VOUS LA FRANCE	Cass/EC	£17 (d)
	Book	£5.25 (d)
	Audio Cassettes (2)	£7.50 (a)
Additional charges for discs		£9.00 (d)
DEUTSCH DIREKT	Disc/aud/EC	£16 (c)
	Book	£5.95 (d)
MODEM MASTER		£11 (d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

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(b) £2.50
(c) £1.50
(d) £1.00

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232	£30 (d)
8148 + RS232 + 8K	£65 (d)
8165 IEEE + Cable	£65 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment	£29 (c)
LX80/86 Tractor Feed	£21 (c)
LQ800 Tractor Feed	£47 (b)
LQ1000 Tractor Feed	£52 (b)
EX800/1000 Colour option	£59 (b)
HI80 HP GL Emulation Rom + Ram	£63 (c)
HI80 Printer Emulation Rom	£38 (c)

SHEET FEEDERS:

8338 LX80	£52 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
LQ800	£135 (b)
LQ1000	£179 (b)
EX800	£135 (b)
EX 1000	£309 (b)
FX 800	£135 (b)
FX 1000	£179 (b)

Ribbons:

RX/FX100/100 + . FX105	£7 (d)
RX/FX80/80 + , FX85	£4 (d)
LX80	£4.50 (d)
LQ800	£8.50 (d)
LQ1000	£10 (d)
EX800/1000	£7.50 (d)
H180 Pen Set (Aqueous/Ball point)	£8.25 (d)

Dust Covers:

FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100 £7.50 (d)	**KP910** £7 (d)

HITACHI 672 Plotter

Aqueous Pen Set six pens	£18.50 (d)
Oil Based Pen Set six pens	£25.00 (d)

TAXAN CANON Accessories:

RS232 + 2K interface	£63 (d)
Ribbon, KP810/815/910/915	£6 (d)

Star Printer

NL10 Sheet Feeder	£52 (b)
NL10 RS232 Interface	£69 (c)
NL10 IBM Type Interface	£39 (c)
NL10 Ribbon	£4.50 (d)

National Panasonic KX P1080/81

Spare Ribbon	£4.50 (d)
Serial Interface	£39 (c)
KXP3131 Tractor	£90 (a)
KXP3131 Sheet Feeder	£189 (a)

JUKI 6100

RS232 Interfaces	£65 (d)
Tractor Feed	£149 (a)
Ribbon (Carbon)	£2.00 (d)
Spare Daisy Wheel	£14 (d)
Sheet Feeder	£219 (a)

BROTHER HR20

Daisy Wheel	£18 (d)
Tractor Feed	£116 (a)
Spare Ribbon Nylon	£3.00 (d)
Spare Ribbon Carbon	£4.50 (d)

INTEGREX INK JET COLOUR PRINTER

Spare Ink Cartridge Black	£9 (d)
Spare Ink Cartridge Colour	£15 (d)
Paper Roll	£7 (d)

Printer Leads:

BBC Parallel Lead (1.2m)	£6 (d)
BBC Serial (Epson) Lead (1.2m)	£7 (d)

Other lengths can be supplied on order:

IBM Parallel Lead (2m)	£12 (d)

PAPER & LABELS

Plain Fanfold paper with micro perforations:

2000 sheets 9½"x11" 60 gsm/sq m	£12 (£3)
2000 sheets 14½"x11" 60gsm/sq m	£18.50 (£4.50)
1000 sheets A4 90 gsm	£12 (b)

Labels/1000:

Single Row 3½ × 1 7/16"	£5.25 (d)
Triple Row 27/16" × 17/16"	£5 (d)

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B
BBC Model B +
BBC Master 128
BBC Compact
6502 Second processor,
Turbo coprocessor
All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable.

WINDOWMATIC

All users of Acorn's VIEWSHEET speadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in up to 10 seperate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of rectifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOWMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

WINDOWMATIC is compatible with BBC Master and BBC B+. A 6502 2nd processor must be fitted to a model B to run Windowmatic. Windowmatic is fully compatible with Turbo and 6502 2nd processor.

The program is supplied on disc with a comprehensive manual.

VU-TYPE

Do you have finger trouble when typing?
Do you letters look like this?

Dear Sor,
I wuold like to .....

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d)
instead of the usual £15. Offer valid while stocks last

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
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Pantry Antics
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"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach." **Acorn User October 1986**

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
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- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
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- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

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The third part of the Universal Development System: a Meta labelling dissassembler.
Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
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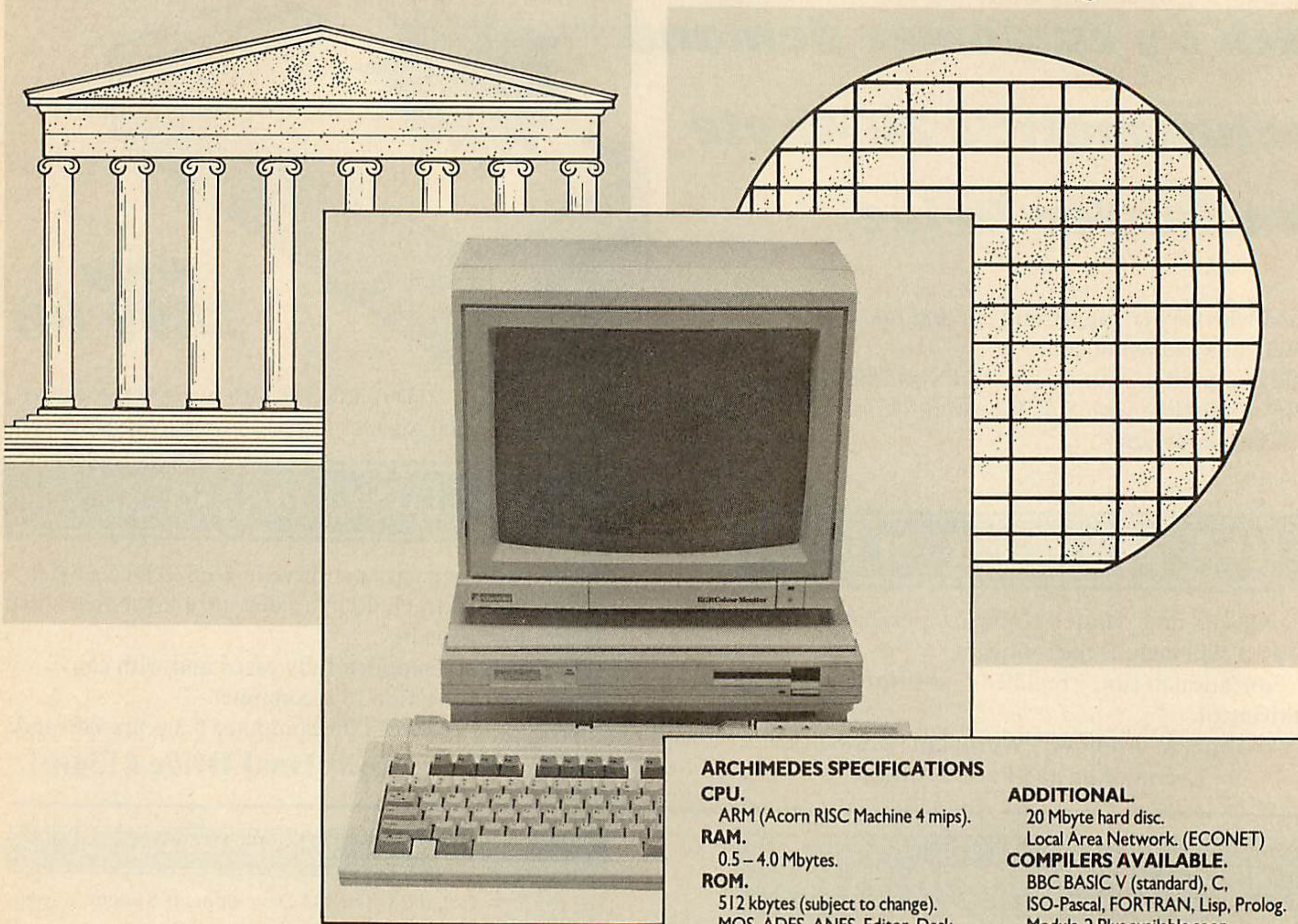
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SOLIDISK MASTE

Solidisk Dual Density Disc Systems:

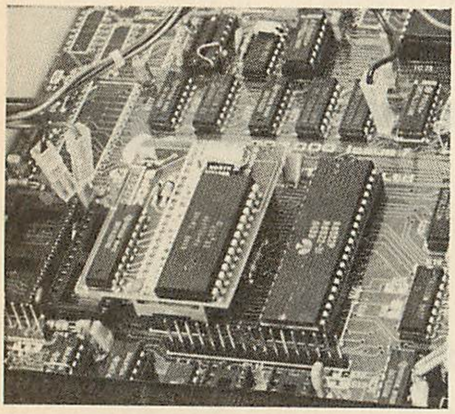
Solidisk offers two types of disk filing system, with a choice of two Rom types. Both are based on the Western Digital WD1770 chip — the standard not only for the BBC model B, but also the BBC+, Master, Compact and ADFS. Both are fully compatible with Acorn Roms, offering complete solutions to the problems of updating the BBC, based on 1770, 8271, DFS and ADFS systems.
Not only is our range therefore unequalled, but also the features it offers; if you don't believe us, check other makes before you buy.

Which DFS?

WD-1770 DDFS Disk Interface:

If your Beeb has not yet been upgraded to disc, then the DDFS is the right choice. It is certainly the most popular version on the Beeb and easy to fit. Use with Acorn or Solidisk Roms to give compatibility with any 40/80 track drive, with or without PSU.

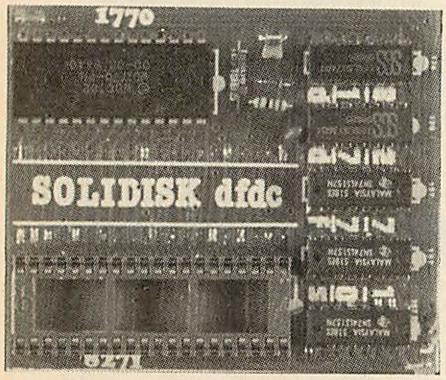
New low price without Rom £35.00
With STL 2.2 ROM (see below) £45.00
With STL 2.1 ROMs (see below) £55.00



WD-1770+8271 DFDC Disk Interface:

If you already have an 8271 based DFS from Acorn, Watford Electronics, Pace, Cumana or Viglen, this is the only way to add the WD-1770 to your system. Fully compatible with the Acorn DNFS1.20 ROM for the 8271 and Acorn ADFS for the 1770. Allows the Acorn chip set to self-erase, keeping memory requirements (and PAGE) at a minimum. For maximum performance, use the STL 2.2 Rom (for both 8271 and 1770). If ADFS is required, use Acorn DNFS1.20 ROM (for your 8271) with the STL 2.1 Romset (for the WD-1770). The last combination will still allow self erasure, and will add single and double density, cross format file copy, ADFS as well as NFS. In other words, everything imaginable with the Beeb.

New low cost DFDC without Rom £40.00
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Which ROMs from Solidisk?

STL DFS 2.2 ROM:

Runs with both 8271 and WD-1770 chips from Acorn, Watford and Opus, and 1770 from STL, and offers the following features:

★ 40/80 track software switching ★ unlimited catalogue entries ★ automatic Read after Write for media security ★ runs with Z80, 6502 and Econet ★ more commands than any other DFS including FORMAT in 40/80 track, VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK, DSTEP, ETC ★ when used with the WD-1770, reads disks in single and double density and IBM format ★ 60 per cent free extra storage space in double density (640K per disk compared with Acorn's 400K) ★ more speed and bigger file size.
Supplied on one 16K Rom with manual

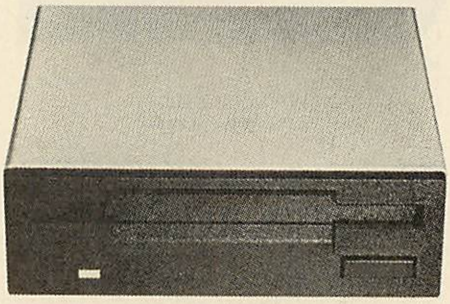
Order as the DFSR2 .... £20.00

PLEASE SPECIFY WE/OPUS/MASTER/COMPACT as applicable.

The ADFS 2.1 ROMSET:

This double ROM set has all the commands of the STL DFS 2.2. Rom but runs ony with the 1770, not the 8271 system. It has many more besides, including all the commands in the Acorn ADFS Rom.
PLUS: ADFS disk formatter (for 40, 80 and 160 tracks) and VERIFY ★ MVADFS and MVDFS to transfer cross format disks between DFS and ADFS with automatic PAUSE for disk change when using a single drive ★ user specified (1 to 10) number of file channels to keep PAGE to a minimum ★ runs with the Z80, Turbo, 32016 and the new 80186 PC compatible upgrade.
Supplied on two 16K Roms or one 32K with two user manuals
Order as ADFSROM 2.1 .... £30.00

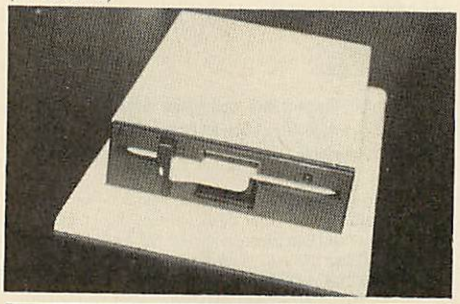
PLEASE SPECIFY WE/OPUS/MASTER/COMPACT/16K OR 32K as applicable.



Solidisk FD35 3.5″ Disc Drive:

This is a superb 80 track, double sided, dual density drive, also useable on the ATARI ST. You get up to 640K maximum per disc (800K with the 80186) and at its price, you are guaranteed of extremely good value. Comes with demo disk.

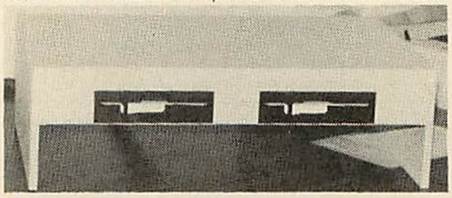
Order as FD35, single drive £100.00
Order as TFD35, twin drive £200.00
Order as ADFS16 for the Compact £113.85
Separate PSU if required (PSU/35) £25.00
Recommended media:
Sony Double Sided, double density, 135 TPI or equivalent (£29 per box of 10).



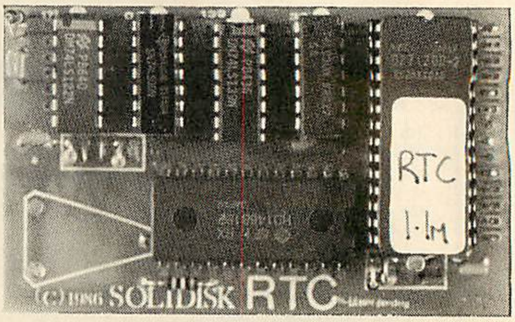
Solidisk FD525 5.25″ Disc Drive:

This is a superb 80 track, double sided, dual density drive and very fast. You get up to 640K maximum per disc (800K with the 80186 board), 40/80 manual switch is optional as most Acorn DFS ROMs and Solidisk's have automatic 40/80 track software switch.

Order as DF525, single £119.00
Order as TFD525, twin in a bridge £228.00
Orders as TFD525/CPU, twin in the CPU case with detachable keyboard case for Beeb £239.00
Separate PSU if required (PSU/525) £25.00
40/80 track manual switch optional £2.00

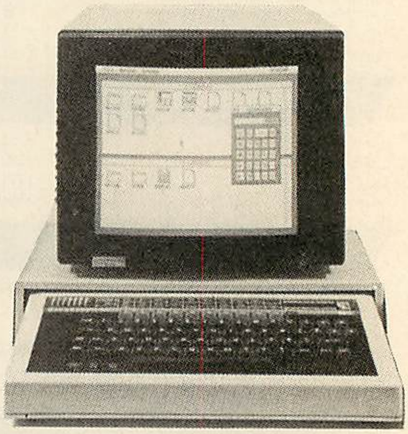


PLEASE SPECIFY SWITCH/MASTER/COMPACT/ ELECTRON if applicable.



Solidisk Real Time Clock:

The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the Beeb with absolutely no other connection to make. It is powered by a rechargeable NICAD battery which should keep the RTC active throughout the Summer holidays.
Star commands include: Alarm, Bell, Boot, Configure, Dalarm, Noclock, Roms, RTC, Settime, Show, Status, Time and Unplug. FX161 and 162, Osword 14 and 15 are similar to the Master 128. It is also compatible with Basic 4's TIME$.
The RTC has many of the autoconfigure features of the MASTER with the same command syntax: Caps/Nocaps, data, delay, Fdrive, File, Ignore, Lang, Loud/Quiet, Mode (0-135), Boot/Noboot, Dir/Nodir, Time/Notime, Printer, Repeat, Rx, Scroll, Tube, Tv, Tx. If your Beeb has an AMX mouse, the RTC offers a DESKTOP and a CALCULATOR, just like GEM!
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Secondhand BBC Model B's:

All secondhand BBC Model-B's are guaranteed for 6 months on labour.

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Issue-2	160	185
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Issue-3	157	177
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Issue-7	206	226

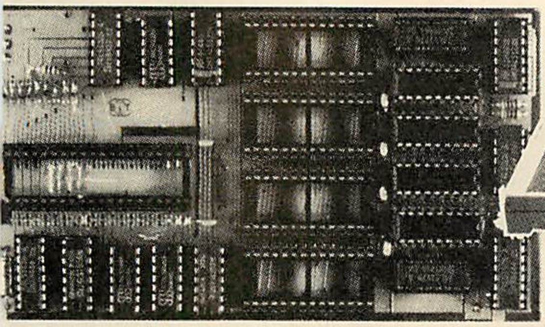
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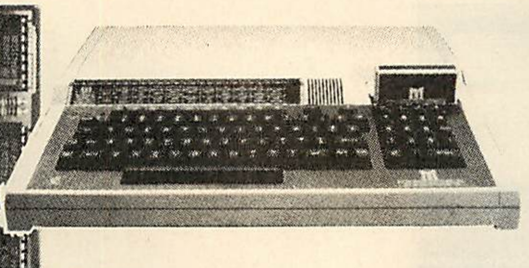
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RISE YOUR BEEB!

Solidisk Technology



TWOMEG 128



MASTER 128

New: The Twomeg 128K board

Solidisk has always been closest to emulate the MASTER 128K. The Twomeg 128K features 64K of Sideways RAM in four banks: 4, 5, 6 and 7, selected by a single latch at &FE30 for both read and write exactly like the Master. The remaining 64K is more versatile and can be used as four more Sideways RAM (12, 13, 14 and 15) or as Shadow RAM and a 24K printer buffer (good news for wordprocessor users).

The new Twomeg 128K will run Computer Concepts Interword, Sheet and Spellmaster, Acorn View 3.1, Viewsheet, Viewstore, Basic etc.
A clever switch write-protects only the 8 banks of Sideways RAM without affecting the Shadow RAM and the Printer Buffer.
Ramdisk is not forgotten, you can have one in ADFS (if you have Solidisk ADFS) or in DFS for both 8271 and 1770 disc controllers.
Four extra ROM sockets are available directly on the Twomeg 128K board, numbered 8, 9, 10 and 11. Four ROM sockets on the Beeb are renumbered to 0, 1, 2 and 3.
Software is supplied on FIVE discs, containing Wordprocessor, Spelling Checker, Database, Macro Basic, Ramdisk, Menu, Manager etc. Software Pack 2 (five discs) is optional and contains many useful utilities for the machine code programmer. Software Pack 3 also optional, contains around 50 of Solidisk Megagames. List of all programs in these software packs is included in the Twomeg 128K User Manual.
Fitting is extremely easy: just plug in the board into the CPU socket and push 3 terminals onto S20, S21 and S22. Internal logic produces chip select for the &FE30 latch. Free installation by local experts is available.

Order as 2MEG128 .... £60.00

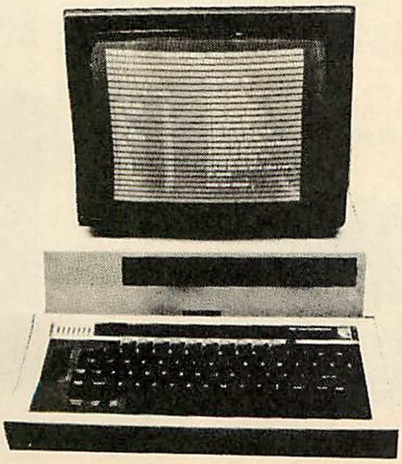
PLEASE SPECIFY /40 TRACK OR /80 TRACK FOR THE SOFTWARE PACK 1, included in the price.

Optional software Pack 2 or 3 (five discs) £10.00

Detachable Keyboard and CPU case:

This 'three box' casing system will help you to organise your desk and improve comfort. The keyboard features the lowest profile (maximum height of any key is 47mm) and does not skid. Typing angle is 2-3 degrees better. The monitor sits on top of the computer. Pure metal construction provides EMF shielding against phantom keyboard interrupt and accelerates heat dissipation (no messy metal strengthening over plastic). Keyboard lead is 24" long.

Order as K/CPU case, special offer price while stocks last £25.00
Note:
Post and packing £6.00



The Fourmeg 32K board:

The Fourmeg 32 is a ROM expansion board on its own with up to 224K of installable firmware. It also is the FASTEST shadow RAM board around (it runs at 4 MHz while others run at 2 MHz, including the MASTER), and the fastest Sideways RAM board. It consumes also less power than any other ROM RAM board through the extensive use of CMOS devices.
The top row of five ROM sockets will take software ROMs, up to 32K each, such as used on the Beeb Plus, the MASTER or the Compact. They are high speed sockets.
The middle row contains 40K of high speed CMOS static RAM chips, acting as a Shadow RAM and a printer buffer or as two banks of Sideways RAM. Write-protection of Sideways RAM is performed by separate Read and Write registers with automatic write-protect when one presses the BREAK key.
The CPU is a 4 MHz, CMOS technology, GTE 65C02, similar to the one on the Turbo board, replacing the existing 6502.
The Fourmeg 32K is also upgradable, once more by the latest CMOS technology: 62256, 32k RAM on a single chip which plugs into one of the high speed ROM sockets.

This board is designed such that one can have everything required on a single, compact and easy to install unit. All the necessary software is in a MANAGER ROM (supplied). Star commands include: Shadow, Ramdisk, Ramoff, Ramdfs, Ramadfs, Ramdrive, Testram, Plus. A complete toolkit to assist programming in Basic is also included: Hardbreak, Join, Keyload, Keysave, Kill, Lvar, Menu, Msearch, Mzap, Page, Printer, Rcat, Number, Report, Rload, Rwipe, Salvage, Status, Sound. One year guarantee.

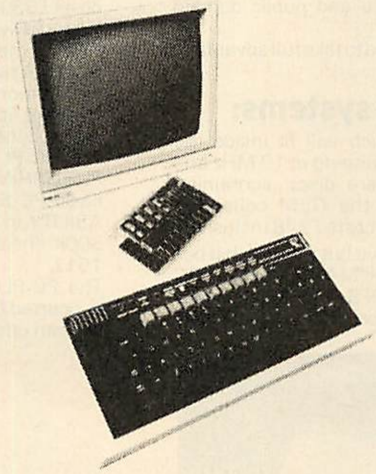
Order as FOURMEG 32 .... £70.00
Additional 32K chip (optional) £15.00
Software packs 1 to 3 (optional), each of five disc £10.00

The Fourmeg 256K board:

The Solidisk Fourmeg 256 board combines high CPU speed (4MHz GTE 65C02) with large memor size (256K Dynamic RAM, 8K static RAM) and powerful supporting software (32K MANAGER ROM). It offers four ROM sockets featuring high speed and high capacity (up to 64K ROM per socket), 8 shadow RAM banks, 8 Sideways RAM banks or even both.

Order as Fourmeg 256K £135.00

NOTE: NO MORE ROM BOARD TRADE-IN IS ALLOWED AFTER 1ST MAY 87.



Wordwise Plus or Interword Special Deal:

If you buy Wordwise Plus or Interword together with a Twomeg or a Fourmeg board, you get extra special discount!

Wordwise Plus (bundle only) £30.00
Interword (bundle only) £50.00

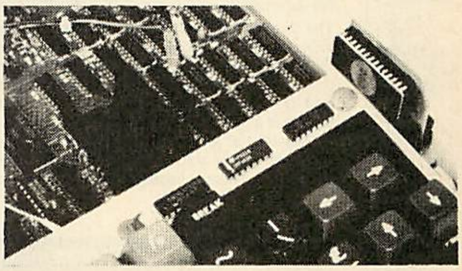
Special Offers on Sideways RAM boards:

These exceedingly popular systems (40,000 plus units sold) enables the Beeb users to load ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play Solidisk Megagames, bigger Basic (Vstore), store music and inumerable other uses as supported by a library of 15 software diskettes.
They consist of a base unit plugging into the rightmost ROM socket on the Beeb and an exchangeable RAM card with capacity ranging from 32K (two Sideways RAM banks) to 128K (8 Sideways RAM banks). They are now made available to you at less than half their normal price, all offering extremely good value. One year guarantee, supplied with User Manual and one software disc.

SWR32, 32K RAM, disc No 1 .... £20.00
SWR64, 64K ROM and two 16/32K ROM sockets, Disc NoI £30.00
96K Extension for SWR 32 .... £25.00
SWR128 (new style), 128K RAM, two 16/32 ROM sockets £45.00
Software Packs 1 to 3, each of five discs, any pack £10.00
Any disc volume 1 to 15 each £2.00

PLEASE SPECIFY /40 TRACK OR /80 TRACK as applicable.

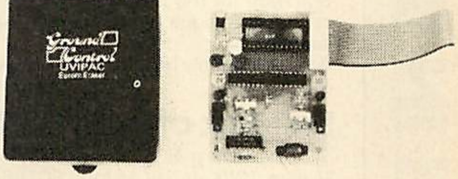
Electron Disc Interface: £50.00
BABT approved Modem plus Linemaster ROM £30.00



EPROM Programmer:

The UVIPROM is the cheapest Eprom programmer on the market yet the easiest to use, will program 2764 EPROMS in one minute and 27128 in two minutes.
A different version called the UVIPROM32 will program 27256 EPROMS in 4 minutes.
The MULTIPROM is the Deluxe version, combining the capacity of the UVIPROM and the UVIPROM32 and some other features. Use it to program 2764, 27128 (normal and A type), 27256 (12.5V and 21V), 27512, 27513 etc. Textool 28 pin ZIP socket fitted as standard.

UVIPROM plus disc No 10 .... £20.00
UVIPROM32 plus disc No 10 .... £20.00
MULTIPROM plus disc No 10 .... £44.50
UVIPAC Eprom Eraser £20.00
2764 EPROM each £2.00, ten for £16.00
27128 EPROM each £4.00, ten for £34.00
27256 EPROM each £7.00, ten for £63.00
Panasonic KX-P1081 Special Offer: .... £149.00 + VAT



IMPORTANT NOTICE: TRADE-UP

Solidisk will accept return of memory boards up to ONE YEAR old for TRADING-UP. The selling price (below) is the price we sell the same goods at the time of the trade-up transaction.

Age	Trade-up allowance
Up to 3 months	90% of selling price
Up to 6 months	85% of selling price
Up to 9 months	80% of selling price
Up to 12 months	75% of selling price

If the balance of the upgrade is less than £15, a minimum charge of 15 is made.

****
As a result of our MASTERPLAN, we have a number of BBC Model B's for sale every day. All are fully inspected, reconditioned if necessary, and guaranteed. All have a new DDFS fitted as standard. We also buy second-hand Beeb for cash. See our price list for details.
****

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

SOLIDISK ADVANCED TELETEXT: SAT-1

Would you like your Teletext receiver to:

1) Tune automatically for the best reception?
2) Collect and display Teletext transmission?
3) Download free software?
4) Receive TV picture and sound?
5) Work equally well on other micros?
6) Just plug into your micro?

You might not be surprised that all Teletext systems are not equal. So what can Solidisk Advanced Teletext do that our competitors can't or won't?

Solidisk Advanced Teletext SAT-1 will automatically check all receivable channels in your area and switch the reception to the best channels for BBC1, BBC2, ITV1 and ITV2.

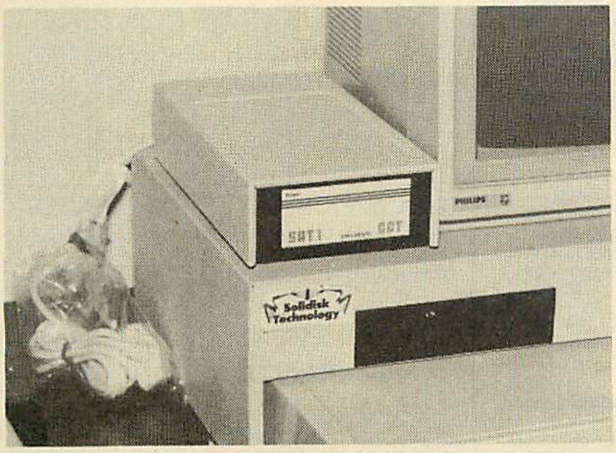
Solidisk Advanced Teletext SAT-1 has IV compatible colour video output to display TV pictures on compatible monitors. It has TV SOUND too. So while it downloads your software, you may watch TV instead.

Solidisk Advanced Teletext SAT-1 works on Amstrad PC, Commodore C64 and 128 and soon on AMIGA A-500, ATARI-ST and the ARM. You only need to buy an appropriate lead and the CCT software for the machine you intend to use the SAT-1 with.

The SAT-1 has its own mains power supply and uses the latest technology on CCT, SAW and tuning devices. It has a 5-pin DIN socket which is connected to any colour computer through an appropriate DATA lead. On the BBC Model B and Master 128K, the DATA lead plugs into the user port. On the Master Compact, it goes to the PRINTER port. Your TV aerial must also be adequate to give a snow free TV picture.

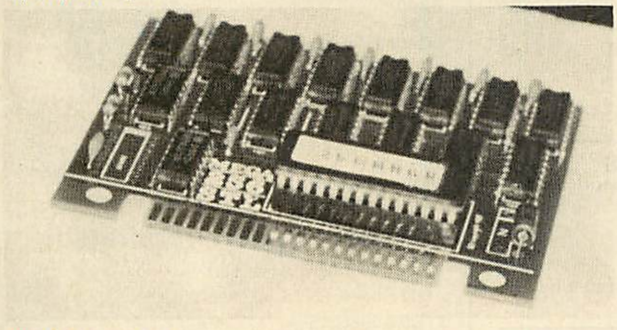
Price:

SAT-1/BBC with BBC lead and software disk including VAT	£100.00
SAT-1/COMPACT with Compact lead and software disc 3.5"	£101.00
Lead and software for any other micro, eg PC1512, C64 and C128, ST 520, A500 etc from	£15.00



RAMDISK AND PRINTER BUFFER FOR THE MASTER 128K

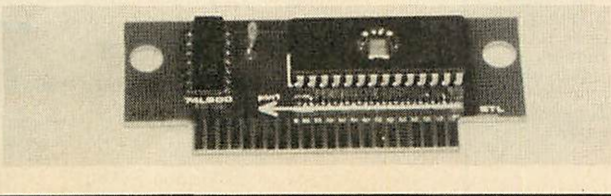
The Solidisk MEGA 256K card plugs into the MASTER cartridge slot. And add instantly, 256K bytes of RAM to your MASTER 128K.
Need a RAM disk?
Easy.
Just enter *RAMDISK <n> and the number of K bytes you want for your RAM disk. In DFS or in ADFS (or both RAM disks with a little bit of extra finger work). And up to 240K in size.
A printer buffer?
Equally easy.
Enter *PRINTER and the number of K bytes you want.
Loading ROM images into the extra RAM is just as easy as to the existing Sideways RAM.
But then, there is only one problem: you can't be too expansive with only 256K. But the MEGA 256K card isn't too expensive either: at only £100 including VAT, wouldn't you say 'the price is right?'



THE MEGA 256 CARD

WANTED: SOFTWARE FOR OUR ROM CARTRIDGES

The new ROM cartridge is extremely low profile (2" high) and unobtrusive. It can be used with most ROM types: 64K, 128K, 256K and the 27513 family. Low cost (from £1 each) and good reliability (500+ insertions) make it ideal media for selling games.



MASTER SERIES:		
AMB15	Master 128	499.00
ADB12	Master ET	399.00
ADC06	Turbo Upgrade	125
ADC08	80126/512K	228.00
ADF13	Eprom cartridge	14.95
MANUALS AND DOCUMENTATION:		
ADJ22	Ref manual Pt 1	14.95
ADJ23	Ref manual Pt 2	14.95
MASTER COMPACT SERIES:		
ADB20	Master Compact Single drive	441.25
ADB20+ADF30	Master Compact S/D with TV mod.	457.35
ADB20+ADF31	Master Compact S/D with Mono monitor	537.85
ADB20+ADF32	Master Compact S/D with Colour monitor	687.35
ADF15	RS232 kit	29.90
ADF16	Second 3.5" floppy drive	113.85
ADF17	PAL TV Adaptor	29.90
ACORN SOFTWARE:		
SUB27	Viewstore database ROM	59.80
SUB18	Pascal	69.00
	FORTH	19.90
	LISP	19.90
	MICRO-PROLOG	79.95
SOLIDISK SOFTWARE ROMS:		
CDFS	single and double density DFS ROM for the COMPACT	10.00
MADFS	DFS and ADFS ROM (32k) for the Master	20.00
LMS	communication ROM for the Master	10.00
SOLIMON	Machine code monitor for Master/Compact	10.00
INSIGHT	Intelligent disassembler, XREF	20.00
UVP	Eprom programmer software (8k)	5.00
DISC DRIVES:		
FD35	3.5" 80-track double-sided single drive	100.00
TWIN35	Twin DF35	200.00
FD525	5.25" 80-track double-sided single drive	115.00
TWIN525	Twin DF525	230.00
20MB	Winchester new model, low cost SEAGATE	700.00
MONITORS:		
BM7502	12" Philips hi-res green screen, lead	85.00
BM7522	12" Philips hi-res amber screen, lead	86.00
CM8533	14" hi-res Colour Monitor, lead	299.00
XC1404	14" Mitsubishi RGB colour monitor, lead	260.00
SOFTWARE PACKS:		
SWPK1	5 software discs, 80 track. Database, spelling checker, machine code monitor, Macro Basic etc. 5.25" format	10.00
	3.5" format	15.00
SWPK2	5 software discs, 80 track. Games. 5.25" format	10.00
	3.5" format	15.00
DISKETTES:		
MD525	5¼" low cost VEREX for all drives	12.00
MD557	5¼" hi-rel MD557, Verbatim DSDD 96tpi	25.00
C102	3.5" low cost Verbatim for all drives	20.00
C103	3.5" hi-rel 90097M Verbatim DSDD 135 tpi	28.00

EXTRA DISCOUNT

If you buy a disc drive or a printer or a monitor at the same time you buy a Master or a Compact, you are qualified for SYSTEM DISCOUNT and a free Software Pack 1 (worth £10.00 or more).

Normal Package Price	System Discount	Reduction
£600-£699	3%	£18-£21
£700-£799	4%	£28-£32
£800-£899	5%	£40-£45
£900-£999	6%	£54-£60
£1000 and above	7%	£70-£££

ORDERING BY POST:

All items can be ordered by post, sending the coupon below and enclosing cheques, POs, drafts or credit card numbers or by phone. P and P is charged as follows:
Less than 1 KG (eg software, cartridges and books): **£2.00**
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Up to 10 KGs (eg computer, monitors, printers, twin disc drives): you can specify either parcel post £6.00 or courrier/Datapost: **£12.00.**
Above 10KGs (eg complete system), please either allow generously or give us a ring for quotation.

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Please fill and send to:

Solidisk Technology Ltd
17 Sweyne Avenue
Southend-on-Sea, Essex SS2 6JQ

Name: ....

Address: ....

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Items: ....

Price: .... P & P: £2/£3/£6/£12

Total: ....

Access/Barclay: VISA Access

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Solidisk Technology Limited, 17 Sweyne Ave, Southend-on-Sea, Essex SS2 6JQ. Tel: Southend (0702) 354674 (16 lines).

OFFICIAL DEALERS IN ESSEX

SOLIDISK TECHNICAL ENQUIRIES: TEL. SOUTHEND (0702) 431122

Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774-40588 Tlx: 8956095 Fax: 01 950 8989
BY POPULAR DEMAND OUR SHOP IS NOW OPEN UNTIL 8PM EVERY THURSDAY
All prices exclusive of VAT; subject to change without notice & available on request.
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Acorn — The choice of Experience

WE — The choice after the Experience

BBC MASTER 128K Micro	**£346**
BBC MASTER with Turbo Board	**£453**
512K Processor Add on Board "inc. Mouse and GEM package"	**£195**

SPECIAL OFFER

FREE . . . £65 worth of Software

*Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and **Watford's** unique VIEW PRINTER DRIVER ROM – an essential tool for all users of the Master's built-in VIEW wordprocessor; with every Master purchased from us.*

ADD-ONs & ACCESSORIES

BBC AIV (Domesday) System	£3479
Turbo 65C102 Add-on Module	£99
BBC MASTER ET (Econet Terminal)	£315
Econet Module for the Master	£43
Twin ROM Cartridge for Master	£8
Quad ROM Cartridge for Master	£12
Universal Processor Adaptor	£75
Reference Manual I	(No VAT) £14
Reference Manual II	(No VAT) £14
Advance Ref. Manual	(No VAT) £19
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Kit complete	£42
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
Z80 Acorn 2nd Processor package	£325
ARIES' Professional IEEE Interface	£238
Acorn IEEE Interface Complete	£265
Acorn Teletext Adaptor	£95
Acorn Bitstick I	£299
Robocom Bitstick II	£759
Upgrade for Bitstick I to II	£450
Bitstick Multiplotter Driver	£65

BBC MASTER COMPACT

All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled softwares.

System 1	Standard Package	£385
System 1A	System 1 + TV Modulator	£399
System 2	System 1 + Green Hires Monitor	£469
System 3	System 1 + Medium Res Colour Monitor	£599

RS232 Kit for BBC Compact	£26
Additional 3½" Drive for BBC Compact	£99

(Securicor carriage £7)

The 80186 Co-Processor Package

This package consists of the Master 512 board, Watford Co-Pro Adaptor, Acorn 1770 Disc Upgrade and Acorn ADFS. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£275

CO-PRO Adaptor



Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.
Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.
With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.
Master owners may use Co-Pro to add a second Co-processor externally.
Watford, brings power to your BBC at only:
£50.00 (carr £5)

VARIOUS PRINTERS

● FX80/85 Tractor Feed	£35
● EPSON Hi-80 Printer Plotter	£229
● Hi-80 Refils, set of 4 Pens	£7
● EPSON Paper Roll Holder	£17
● EPSON LX86 Printer	£189
● EPSON LX80/86 Tractor Feed	£20
● EPSON LX80/86 Sheet Feeder	£49
● EPSON FX800 Printer	£315
● EPSON FX1000 Printer	£439
● EPSON EX800 Printer	£405
● Colour option for EX800/1000	£55
● EX Colour Ribbon	£18
● EPSON LQ800 Printer	£439
● LQ800 Tractor Feed Attachment	£39
● FX/LX800 Single Sheet Feed	£139
● FX/LQ1000 Single Sheet Feed	£149
● HR20 Brother Daisy Wheel Printer	£349

(Securicor carriage charge on printers £7)

PRINTER SHARERS

(Ideal for School environment)

Connect 3 BBC Micros to 1 Printer	£60
Connect 6 BBC Micros to 1 Printer	£99
PRINTER CHANGER	
Connects 3 Printers to 1 Micro	£65

(Cables extra, specify type required when ordering)

65C102 2nd PROCESSOR Package

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

£139

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £3.00
27128-250nS £3.40

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £2.70
2 × 6264LP (16K) £5.30

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	**£269** (carr £7)
Kaga KP915 Printer	**£369** (carr £7)
RS232 Interface	£49
RS232 Interface with 2K Buffer	£69
RS232 Interface with 16K Buffer	£89

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£27	RS232 + 2K Buffer	£55
IEEE 488	£65	RS232 & 8K Buffer	£75

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 metre Cable	£12

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Brother HR15	£3.00	-
FX100	£7.00	-
FX80-MX80-FX85	£4.50	£4.95
RX80	£4.50	£4.50
LX80	£4.00	£4.50
LQ2500	£9.00	-
Centronics GLP	£4.00	£3.75
KAGA KP810	£5.25	£4.75
Panasonic KX1080/81	£4.50	£4.75

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

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1,000 Sheets 9½" × 11" Fanfold Paper	£7
2,000 Sheets 9½" × 11" Fanfold Paper	£12
1,000 Sheets 15" × 11" Fanfold Paper	£9
1000 Sheets true A4 Fanfold Paper	£11
2000 Sheets true A4 Fanfold Paper	£21
Teleprinter Roll (Econo paper)	£4

Carriage on 1,000 Sheets £1.50

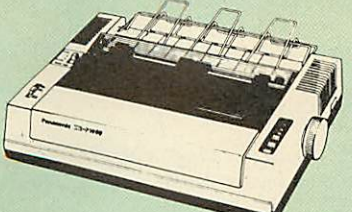
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	£5.00
1,000 90 × 36mm (Twin Row)	£4.90
1,000 90 × 49mm (Twin Row)	£7.50
1,000 102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Panasonic KX-P1081
(Now IBM Compatible)



Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy **120 cps** of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

(Price inludes, FREE A 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£155** (carr. £7)

Optional RS232 Interface: **£39**

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional, logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£245** (carr. £7)

Single Sheet Feeder	£195
Tractor Feed	£90
Spare Ribbon	£3.00

Acorn-Olivetti JP101 Ink Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**

JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.

Pack of 4 refills **£10**

Screen Dump ROM for JP101 £10

Anti-Glare VDU Screen

This extremely effective, easy to install, 12" VDU screen eliminates harmful glare, improves contrast on colour monitors. A must for all wordprocessor users. **£12**

Printer Stand Type-YU-S25



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding. **£34**



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

- 1431 – Medium resolution as used on the BBC television computer programme **£175**
- 1451 – High resolution, suitable for word processing in mode 0 **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
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KAGA-TAXAN 12"

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- KAGA KX1202G Long persistence Hi-Res Green Monitor **£93**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor **£93**
- KAGA Super Vision 2 **Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing **£269**
- **Kaga Super Vision 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£319**

STAR BUY

- PHILIPS 14" Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono connectors. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £209

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

Green (New Design) Hi-res	£69
Amber (New Design) Hi-res	£74

LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for KAGA	£3

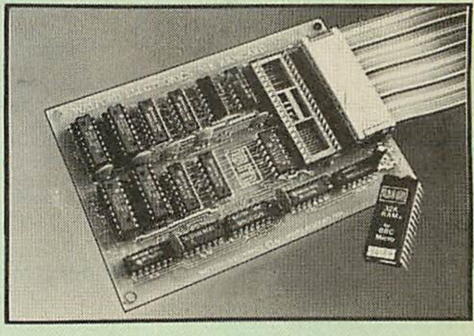
N.B. carriage on Monitors **£7** (securicor)

SWIVEL BASES
for Video Monitors

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress. Front adjustable without removing the monitor.

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

See next page for SPECIAL OFFER

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayε up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

NOW WITH EXTRA FEATURES AT NO EXTRA COST
Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities ten simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).***

PRICES

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£59**
- *Acorn's 0.90 DFS Kit complete* **£57**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95** *(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).*
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

NEW WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our DDFS board has been adapted to allow the use of Acorn ADFS.

Added features include:
- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only £30.00.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your Existing Single Density DFS for our DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

NEW MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £149 (carr £2)

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

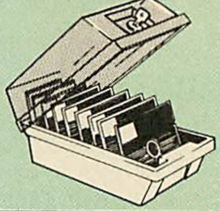
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£8

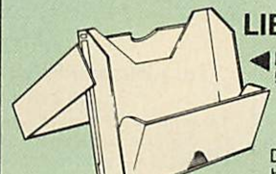
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection –
Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

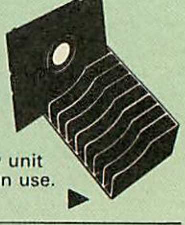


- M35 - holds upto 50 5¼" discs **£8**
- M85 – holds upto 95 5¼" discs **£10**
- M50 – holds 50 3½" Discs **£10**

PLASTIC LIBRARY CASES



◀ Holds up to 10 5¼" Discs. **Only £2.00**



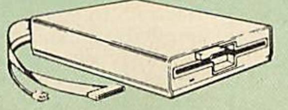
DX-08: This extremely handy unit holdslupto 8 5¼" Disc while in use. **Only £2.00** ▶

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our drives are of Japanese manufacture. All our 80 track drives are already fitted with a 40-80 select switch.

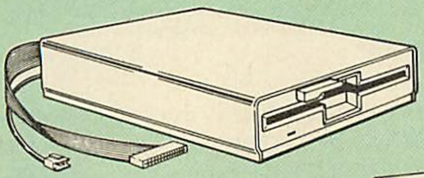
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

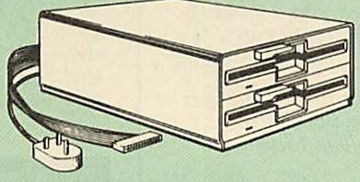
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.





Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £95		CS 200 £108	
400K (720K)	CLS400S £96	CLD 400 £180	CS 400S £109	CD400 £200
800K (1.44M)		CLD 800S £183		CD 800S £204

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. *CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40-80 track).*

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£10**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£15**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£15**
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* **£30**
- *10 × 3½" S/S D/D 40/80 track Discs* **£18**
- *10 × 3½" D/D D/D 40/80 track Discs* **£22**

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 × **M3** 3½" D/S D/D 80 Track Discs* **£20**
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* **£9**
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* **£11**
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* **£14**
- *3" Double Sided Discs* **£3 each**

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£46	£49	£72
● With Sleeves	£49	£52	£75

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.
10 Megabytes **£1050; 30 Megabytes £1549**

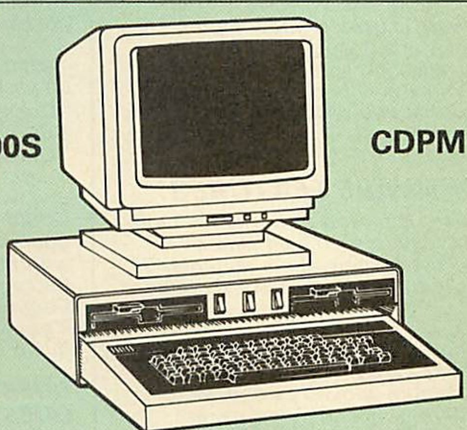
WATFORD's WINCHESTER DRIVES

- 10 Megabyte Winchester with ADFS **£399**
- 20 Megabytes with ADFS **£549**
- 40 Megabytes with ADFS **£999**

WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan **£1499**

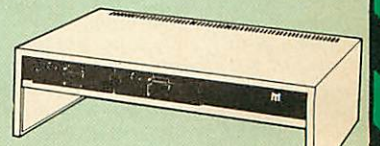
CDP 800S **CDPM 800S**



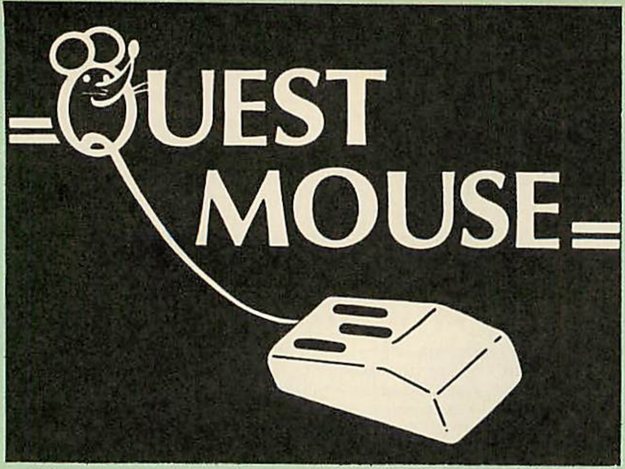
Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £210 **CDPM 800S for Master £225**
(Securicor Carr. £7)

ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.
RRP £250 **Our Price: Only £199** (carr £7)



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc, will work with it.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package
With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package. . ."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE ONLY	***£35***
QUEST PAINT SOFTWARE	***£34***
QUEST FONT DISC	***£12***

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 24 text FONTS for use within Quest Mouse.
P.S. There is no need to worry about any of your existing AMX mouse software. The Quest Mouse is totally AMX compatible so it will work with any of the AMX range of software.

All prices in this advert are exclusive of VAT.

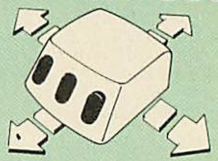
MARK II LIGHT PEN + PENPAL 2

The Watford Electronics Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £18

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £63 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX MAT	**£5**
AMX MOUSE ONLY	**£35**
AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£39**
AMX PAGE-MAKER Pack – A desk-top publishing software. It Works with keyboard, joystick and a mouse	**Only: £32**

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS Over 20 fonts for use with AMX PAGE-MAKER	**£9.50**
EXTRA EXTRA	**£19**
AMX DESIGN (ROM)	**£69**
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX XAM Educational	**£19**
AMX MAX A gem of desktop (ROM)	**£17**

RB2 MARCONI TRACKER BALL

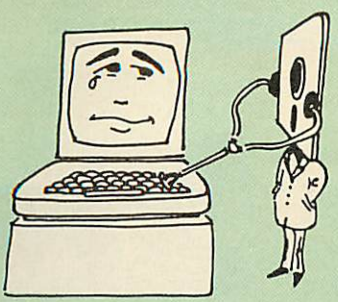
This popular unit is supplied complete with software.
Price: **£59**

FLEET STREET EDITOR

Software pack **£35**

Admin Xtra Disc Utility	**£14.95**
Walt Disney Disc Utility	**£14.95**
Fonts N Graphics Disc Utility	**£14.95**

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Cassette). 4 primary level maths programs **£10.95**
- Maths with a Story 2 (Cassette) 4 further maths programs **£10.95**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£19.95**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£14.95**
- BONDING: Science (Disc) O Level Chemistry program. **£14.95**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£14.95**
- ELECTRONICS IN ACTION (Disc) O Level program **£14.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£6.95**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£17**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£20**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£6.90**
- PERIOD TABLE SOFTWARE **£20**
- USING YOUR COMPUTER (Cassette) 8-12 age **£24**

TED

The Teletext Editor Package for serious users

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.
Supplied on a special 32k package, full facilities are providing for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

Price: £35

ROM-SPELL

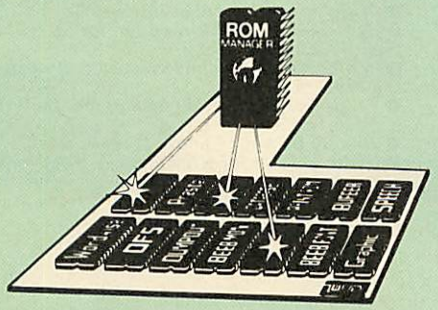
"way ahead of any competition"



Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.
NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

NEW

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!
Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.
The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

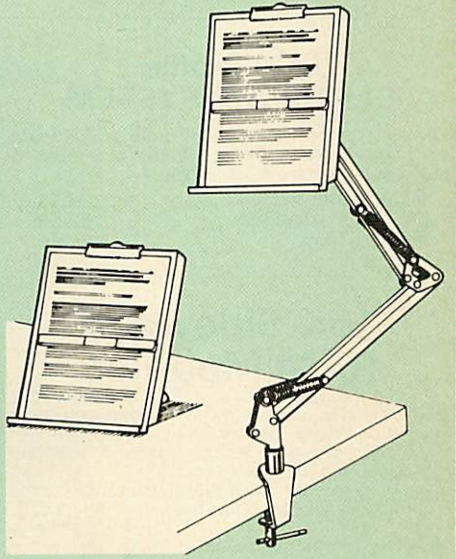
Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

COPY HOLDERS



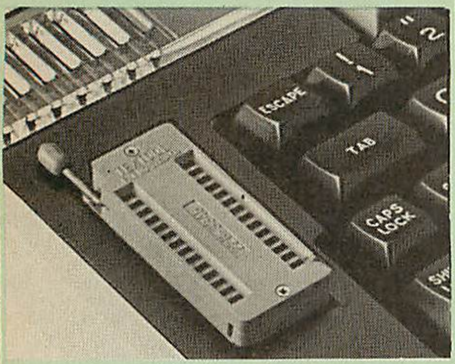
How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.
Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

All prices in this advert are exclusive of VAT.

Continued →

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices in this advert are exclusive of VAT.

16K DISC RAM

Unlike other RAM boards, this revolutionary, battery backed up, write protectable 16K sideways RAM board allows you to run from disc every sideways ROM available.

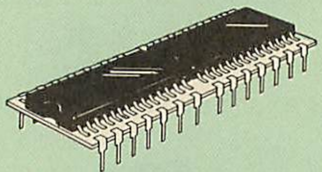
Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £32 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.

Do you require:

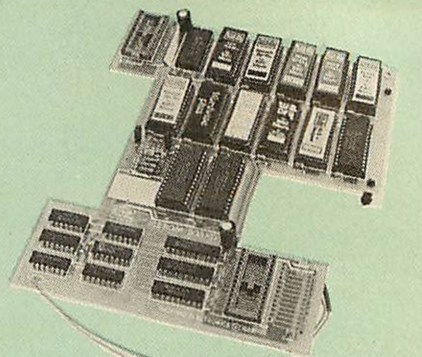
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM
4) Options in brackets indicate optional extras.

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success"

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

NEW

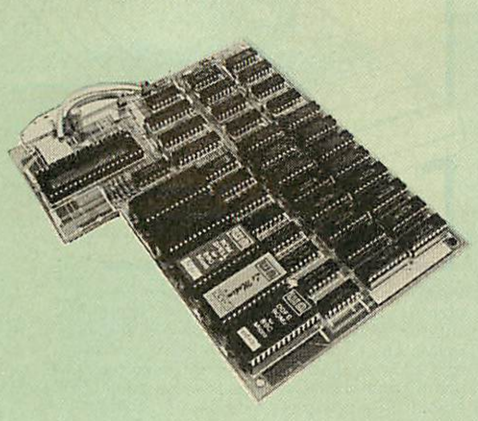
USER PORT SPLITTER UNIT

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£15**

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM **£39***
- *ROM/RAM card with 64k dynamic RAM **£52***
- ROM/RAM card with a massive 128k dynamic RAM **£80**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit **£6***
- *16k Dynamic RAM for Upgrade **£7.50***
- *Battery backup **£3***
- *Read and Write protect switches ...... **£2 each***

*Complete ROM-RAM board (all options installed) **£89***

Le Modem



The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***
- *BT Approval applied for.*

(When ordering, please specify the version required, (BBC or Master)

SPECIAL OFFER

Price: **£74**
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£85

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software	**Only £75**
COMMSTAR ROM package only (P&P on modem £3.00)	**£29**
Auto Dial Utilities Disc	**£9.50**

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

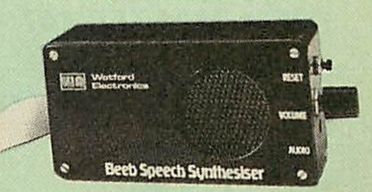
The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£75** **(Carr £3)**
(Write in for full specification)

BT TELEPHONE CONNECTORS for Modems

LJU	1/4A Mini Line Master	**£4.50**
LJU	1/6A Mini Line Slave	**£3.00**
LJU	2/4A Line Master	**£4.00**
LJU	2/6A Line Slave	**£2.50**
LJU	3/4A Flush Master	**£3.95**
LJU	3/6A Flush Slave	**£2.75**
LJU	10/3A Dual Splitter	**£5.50**
	4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise £24

Wordwise plus

WORDWISE PLUS £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £47

Inter SHEET ONLY £37

INTER-CHART ONLY: £26

Inter-WORD Only: **£39**

INTERBASE £59

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£37
VIEW 3.0 ROM	**£54**
VIEW PROFESSIONAL	**£85**
HI-VIEW (for use with 6502 2nd Processor)	**£36**
VIEW Printer Driver Generator Please specify Disc or Cassette)	**£9**
VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£22**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2 for the Master	**£85**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	**£10**
Juki & Brother HR15 (Disc)	**£10**
Silver Reed Printers (Disc)	**£10**

Micros in Business (Disc)
An introduction to Business software for the BBC Micro from Acorn **£43**

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	**£29**
Adv 1770 DFS for Mast/Compact	**£29**
Adv 1770 DFS for BBC/BBC+	**£29**
Adv Disc Investigator	**£24**
Adv. Control Panel	**£29**

MINI OFFICE II

Disc Version	**£14.50**
ROM Version	**£48.00**

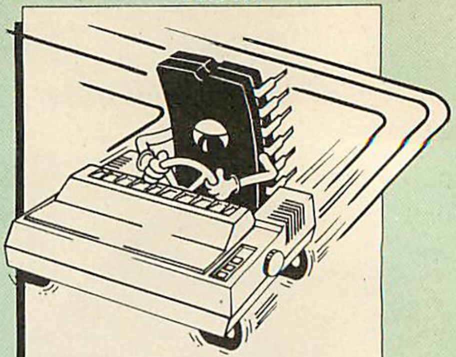
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33



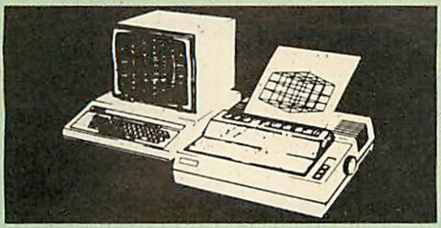
Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:
- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

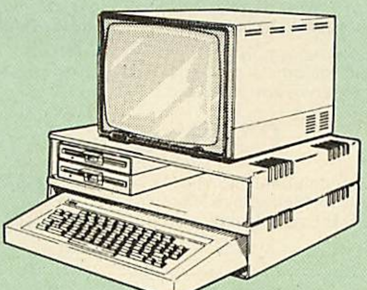
The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

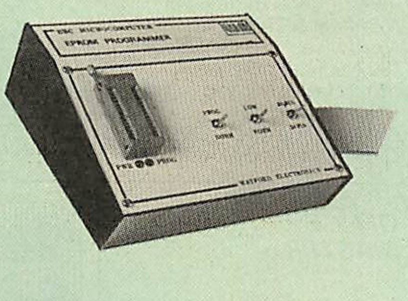
THE NLQ DESIGNER

(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- *NLQ Designer ROM & FONT Disc* **£25**

ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:
- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£65 (£3 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.
- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**



ARIES CORNER

Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.
With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.
Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.
The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32
The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.
The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.
If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	Aries B-12	**£40**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

Continued →

BOOKS (No VAT on Books)

15 Hrs Word Processor Using BBC	£3.95
30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
50 Programs in BBC BASIC	£6.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development System	£7.50
6502 Machine Code for Humans	£7.95
6502 Reference Guide	£9.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£16.95
Art of Music Graphics	£14.95
Advanced Disc User Guide	£16.95
Advanced BASIC ROM User Guide	£9.95
Advanced Programming Guide to BBC	£9.95
Advanced Sideways RAM User Guide	£10
Advanced User Guide for BBC	£10.95
Advanced FORTH	£9.95
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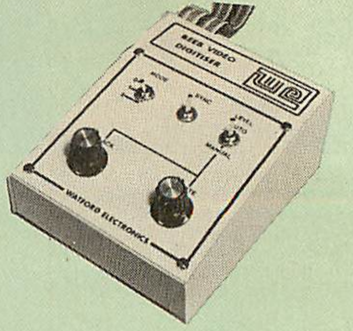
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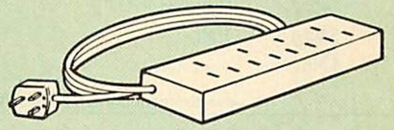
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HINTS & TIPS

Martin Phillips includes a tip to get your micro singing something simply among his advice for beginners

MAKING MUSIC

Many computer programs can be made more interesting by the addition of a tune. You do not need to be an expert musician to encode simple tunes – the hardest part is finding the music. A schoolchild's book of recorder tunes is a good place to start! To show how simple it is, listing 1 in the yellow pages plays the tune *Twinkle, Twinkle Little Star*. The program has been written in such a way as to make the encoding of a tune easy to follow.

The obvious way to program a series of sounds is to use the SOUND statement each time. However, it is quicker and easier to use the READ and DATA statements. The SOUND statement is followed by four parameters; the sound channel number, the volume, the pitch and the duration. Only the latter two change with each note, so only those two numbers need to be stored in the data statements. For simplicity each bar of the tune is given in a separate DATA statement. This also makes mistakes easier to find and correct. The pitch is given first, and then the duration.

Translating the musical notes into sound durations is easy, if none too precise, as the tempo of individual pieces of music varies: a quaver (♪) is given the duration of four, a crotchet (♩) is given the duration of eight, a minim (𝅗𝅥) is given the duration of 16.

These durations should serve as a useful guide, but do experiment with other values if appropriate. Each note should be twice the length of its predecessor. The pitch value has a slight complication. When the original BBC User Guide was written, the chart showing the pitch for each note was slightly out. The mistake was corrected in the B+, Electron and Master Welcome Guides. Figure 1 shows how the pitch values relate to the notes on a stave. Figure 2 then shows the musical notation for the tune *Twinkle, Twinkle Little Star*. From this it can be seen how each pitch and duration value in listing 1 is derived.

One problem with using READ and DATA statements is that the program needs to have some way of knowing how many items there are in the DATA statements. This can be given at the start, but a better way is to put some code at the end to signify that it is the last number. This method is more useful if the DATA statements are to be changed and if the end data values are put in, it does enable the tune to be tested as the data is being entered.

The envelope is set to give a handbell-like sound. Line 140 ends the previous note. Notice that the sound is played twice, through channel one and channel two. You would expect that it would make no difference, but in fact it greatly enhances the tone, giving it a sort of echo. This trick upsets the Electron, which just gives a tuneless short buzz. As the Electron has only one sound channel, owners should change line 120 to read:

120 FOR N=1 TO 1

Finally, it is interesting to hear how the sound alters when line 130 is changed to:

130 SOUND N,1,P+N−1,D

This changes the second of the two notes to make it slightly higher in pitch. Many thanks to Mr A Love of Chorleywood, Herts, for reminding me of the latter tips.

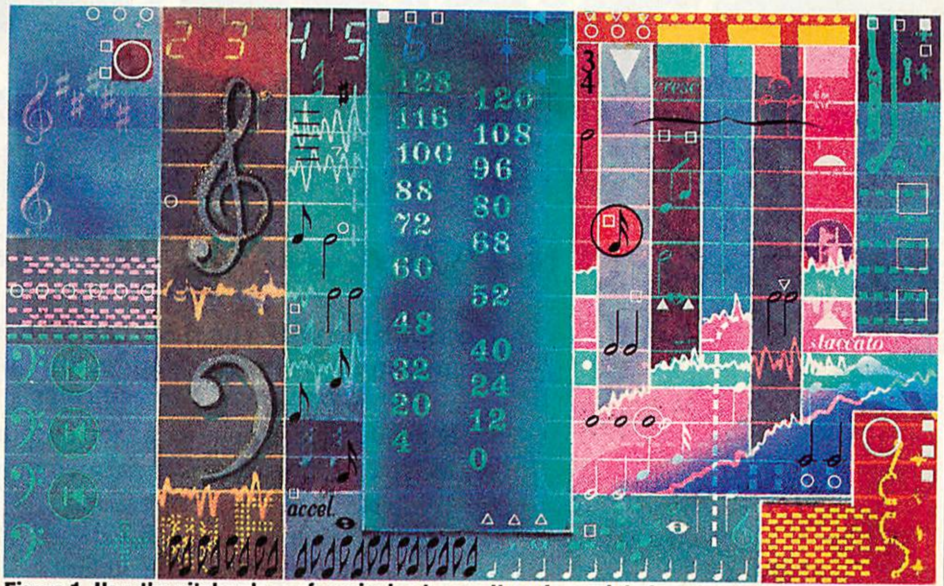


Figure 1. How the pitch values of musical notes on the micro relate to notes on a stave



Figure 2. The score of *Twinkle, Twinkle, Little Star*, the tune played by listing 1!

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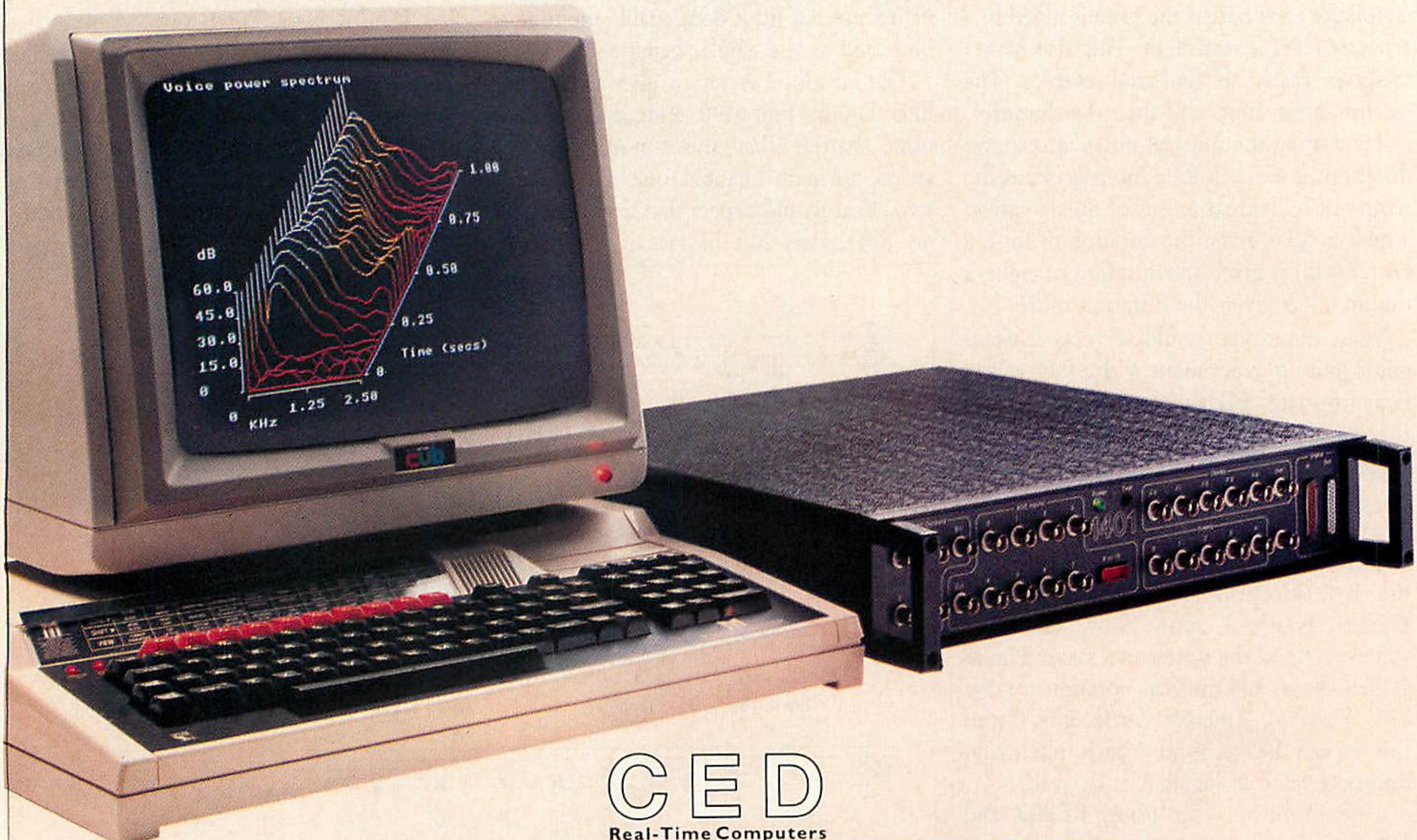
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PRINTING OUT FROM VIEWSHEET

Last month, I showed how a simple spreadsheet could be created using *ViewSheet*. This sheet can be printed out by typing 'PRINT' from the command screen. Because the whole spreadsheet fits on one screen, it will also print out correctly. The row and column headings do not have to be printed. These can be switched off by using the printer window. First press 1 and then type 'P0'. This selects printer window zero. For the example given last month, enter the following:

```
Wi TopL BotR Pos Cw Bw Fmt  Opt
P0 A1   I26       7  7  D2RM TS
```

and press Return. Now the sheet should print out without the row and column heading.

For different spreadsheets, the print windows can be set up so that the sheet will print out each part correctly. Care should be taken when designing a sheet to ensure that it will fit on a print-out if desired.

If using a normal 80-character dot-matrix printer, and more than 80 characters are needed on a line, then set the printer to condensed mode before starting. This will allow up to 132 characters on a line. Condensed mode can easily be set from the command screen if you have an Epson-compatible printer. Press the following sequence of keys:

CTRL-B (switch on printer)
CTRL-A (next character to printer only)
CTRL-D (code for condensed print)
CTRL-C (switch off printer)

When using disc, you can set up a !BOOT file to load your spreadsheet in and perform other tasks at the same time. A !BOOT file can be created using *Edit*, the screen editor on a Master, or in the normal way by typing.

*BUILD !BOOT

then entering the following lines:

```
*SHEET
*TVO,1
MODE 128
*KEYO |S|@|4|@|@|@|M*FX125|M
*KEY1 |B|A|O|C|G
LOAD fname
PRINTER Epson
*FX138,0,192
```

and then pressing Escape.

Finally, to make the computer use the !BOOT file when Shift-Break is pressed, enter:

```
*OPT 4,3
```

What does this do? The first three lines set up *ViewSheet* as described last month. The next line programs function key zero to change the background colour to blue and then to press Escape. This will then make the sheet appear. Function one key is programmed to give the code for condensed print when that key is pressed. The |G at the end will make the computer give a beep, otherwise you don't know if anything has happened. This function key will only work from the command screen.

The next line will load the spreadsheet from disc: substitute your filename for the one given. Then a printer driver is loaded – any one that works with *View* is OK. If you are not using a printer driver then ignore this line. A printer driver does allow several printing effects to be achieved, but it is somewhat complicated to use. The *FX138 calls function key zero to change the screen colour and go to the sheet mode. So all you have to do is press Shift-Break with the right disc in the drive and the spreadsheet is set up automatically.

JUMPING OUT OF LOOPS

Perhaps the most useful command a computer is able to perform is that of the loop; to be able to complete a task and then start all over again. The most common form of loop is the FOR. . .NEXT loop:

```
10 FOR N%=1 TO 10
20 X=RND(5)
30 PRINT X;
40 NEXT N%
```

This program will pick a random number in the range one to five, and print it. It will then repeat this a further nine times before ending. The number of times the program goes round the loop can be changed in line 10. Sometimes it is necessary to jump out of a loop at a particular point. This seems quite straightforward as the example below shows:

```
10 FOR N%=1 TO 10
20 X=RND(5)
30 PRINT X;
40 IF X=1 THEN GOTO 60
50 NEXT N%
60 PRINT " Finished"
```

When the number one is randomly chosen, the word 'Finished' will be printed and the program will end. So what is the problem? Provided the program is going to end here, then nothing is really wrong, but if you use this technique to jump out of a loop in the middle of a program, then this could cause the program to fail at a later stage.

When a program jumps out of a loop, it leaves the loop 'pending'. There is a store in the computer's memory where it keeps the details of all the FOR. . .NEXT loops. The computer keeps details of where to return to after each cycle of the loop. The computer can only store 10 loops on this stack at any one time. Thus if the program repeatedly jumps out of loops, then the space will be used up and an error will occur. This example shows the problem!

```
10 FOR N%=1 TO 10
20 X=RND(5)
30 PRINT X;
40 IF X=1 THEN GOTO 60
50 NEXT N%
60 GOTO 10
```

After 10 number one's have been selected, the program will crash and give the error message, 'Too many FORs at line 10'.

This example is somewhat pointless, but it is surprisingly easy to jump out of a loop without realising it and many programs suffer from this fault. It might then be quite some time before the program crashes. The cure is also obvious, when you want to jump out of a loop, then do so like this:

```
10 FOR N%=1 TO 10
20 X=RND(5)
30 PRINT X;
40 IF X=1 THEN N%=10
50 NEXT N%
60 PRINT
70 GOTO 10
```

Now the program will continue indefinitely as the FOR. . .NEXT loop is closed before leaving it.

THE 1770 DISC FILING SYSTEM

The 1770 interface upgrade kit from Acorn will be of interest to two types of BBC micro owner. Those who only have a cassette system and wish to upgrade to disc, and those with a 8271 disc filing system (DFS) who would like to upgrade it to the later specification. The 1770 disc upgrade is available through Acorn dealers and can be fitted easily on most BBC model B machines. Is it worth upgrading, and how easy is it to fit?

The 1770 DFS has several new commands and works considerably faster than the 8271 DFS. This is a useful bonus if the computer is used with data handling programs that require frequent access to the disc. The most useful extra command on the 1770 DFS is the *FORM command for formatting a disc. This saves having to use a utilities disc. The *VERIFY command is also available in the ROM. The other commands are:

*CLOSE
*EX
*FREE
*MAP
*ROMS

Some other commands have been changed:

*DRIVE
*BACKUP
*DESTROY

*EX is equivalent to *INFO#.* while *CLOSE does the same as Basic's CLOSE #0.

*FREE will display how many files are stored on a disc and how much space is left. At last this gives an easy way to tell whether a disc is 40 or 80 track! *MAP lists the spare space on a disc to see if it is worth compacting the disc. *ROMS lists all the installed ROMs and their socket numbers.

*DRIVE can now be used to get the DFS to read a 40-track disc on an 80-track disc drive. It will not allow the 40-track disc to be written to on an 80-track drive unlike, say, the Watford DFS. *BACKUP and *DESTROY now do not need the *ENABLE message. Instead a prompt is given. If, like me, you always forget the *ENABLE, then you will find this useful.

How easy is it to fit the 1770 DFS? The kit comes with all the components required, a set of fitting instructions (very detailed), and the disc filing system User Guide. For about £40 this represents good value for money. If you are upgrading from an 8271 DFS then some components will need to be removed first. The fitting instructions cover this eventuality. Fitting the upgrade is then a matter of inserting several components into sockets. The hardest part is finding the socket numbers that are printed on the circuit board! A couple of rare situations need checking before buying the upgrade kit. Remove the top cover of the computer and check that sockets are fitted for integrated circuits 78 and 86. If the components are soldered directly into the circuit board, then leave the job to a dealer.

If you only have a cassette machine and wish to upgrade it to a disc machine, then there are a few more considerations to take into account. First, the computer has to be a full model B. If not then a dealer will have to upgrade the computer and fit the DFS. The version of the circuit board fitted is also important. Remove the top cover of the computer and on the main circuit board it will clearly state the issue number. Normally it will be either issue three, four or seven. For BBC computers with issue four or seven circuit boards, fitting is quite straightforward and only needs a few chips plugging into the sockets on the circuit board (provided there are sockets for integrated circuits 78 and 86). If you have any doubts about your ability to undertake this work, then do leave it to a dealer.

BBC computers with issue three circuit boards are rather more tricky. There is a modification to be made to the circuit board before the upgrade will work. Unless you are very confident with a soldering iron then leave this for a dealer to upgrade. If an 8271 DFS is already fitted then this modification will have been made and the upgrade is the same as for the later issue boards.

OSCLI WITH BASIC 1

There are now several versions of the BBC Basic language available for the Acorn micros. It is easy to tell which version you have, type:

*BASIC
REPORT

A copyright notice will be printed out. If the year is 1981, then it is Basic 1, if the year is 1982 then the version is Basic 2, and so on. There is very little difference between any of the later Basics and Basic 2, but there are a few problems with Basic 1. It is possible for owners of Basic 1 to upgrade to Basic 2 for about £20, simply by obtaining a new Basic chip and replacing the old one.

A particularly useful statement, OSCLI, is available from Basic 2 onwards. It allows the * commands such as *LOAD and *SAVE to be accessed through Basic, using Basic variables if necessary. OSCLI can be implemented on Basic 1 by using a short procedure:

```
DEF PROCoscli(a$)
DIM A 20
$A=a$
X%= A MOD 256
Y%= A DIV 256
CALL &FFF7
ENDPROC
```

This procedure will work with all current versions of Basic. But it is not good programming to put the DIM statement in the procedure; it is best put at the start of the program. The DIM space, in this case 20bytes, should be varied to suit the expected maximum length of the OSCLI string. The more correct version is used in the listing shown above right.

A different way of doing this which avoids the use of the DIM statement altogether is to specify the memory location for the string. The following example uses memory &900 at which is normally unused. Note that it is not possible to use zero page locations like this.

```
DEF PROCoscli(a$)
A=&900:$A=a$:X%=0:Y%=9
CALL &900
ENDPROC
```

However, this technique will not work on a second processor, as &900 is part of the normal memory used to store the Basic program! As an example of the use of PROCoscli you could input a filename and then *LOAD that file. Attempting to do the following:

INPUT"ENTER FILENAME:" name$
*LOAD name$

will not work. Instead we must do this:

```
 10 DIM space 50
 20 INPUT"Enter filename: "name$
 30 PROCoscli("LOAD "+name$)
 40 END
 50 :
 60 DEF PROCoscli(a$)
 70 $space=a$
 80 X%=space MOD 256
 90 Y%=space DIV 256
100 CALL &FFF7
110 ENDPROC
```

Clearly before this will work, it is necessary to have that particular file saved on disc. Make sure too that it won't load in on top of the Basic program. To create a dummy file that you can try out the OSCLI routine with, type:

```
*SAVE dummy 8000+10 0 FFFF0900
```

£10

USING ACORN DATABASE IN WORDWISE PLUS

C Dawson from Derby wins himself £10 for sending in a useful routine to manipulate data from Acornsoft's *Database* and then use this to mailmerge using *Wordwise Plus*. Such a technique can be adapted to work with other databases. The first listing, listing 2, extracts relevant information from the data file and stores it in memory starting at location &2000. As each record is read in, there is the option to save it into memory, bypass it or to quit. Quit saves all the records previously stored in memory.

When the end of the file is reached, the records in memory are saved to disc automatically. Only the data required is stored, and the text is stored the right way round so it can easily be extracted by *Wordwise Plus* (*Database* stores all text backwards!).

Listing 3 is a *Wordwise Plus* segment program, which should be placed, say, in segment zero. It reads in five fields for each record. These can be used for name, street, town, county and post code. In *Wordwise Plus*, use <f0> PS A$ <f2>, <f1> PS B$ <f2>, etc. Wherever you wish the appropriate field to appear (<f1> and <f2> are the green and white embedded commands). Type or load in the standard letter into the main text area with the disc containing 'NEWFILE' in the disc drive. Pressing Shift-f0 will start the merge facility. Do remember to put a begin page command at the end of the standard letter, otherwise each letter will carry on from the end of the preceding one!

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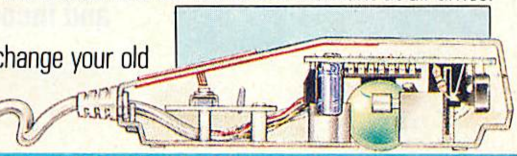


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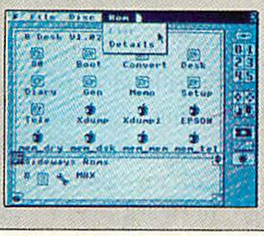
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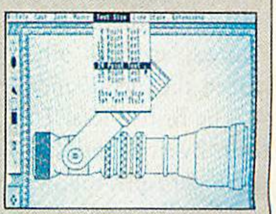
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DAY TO DATE

This month Joe explains how to find the date in a program and incorporates a calendar into the *JOE* desktop

Joe Telford

Have you ever thought how much better off we would be if we didn't have to keep track of the date? That simple fact was brought home to me forcefully the other week when an anniversary, a tax demand and the cat's birthday all came together. I adopted my usual stance, saying British Real Time starts tomorrow, so don't worry. Regular readers of this column will be amazed to find that after years of research I have discovered that there are actually three basic calendars permanently operating. The first is the common calendar which the average person-in-the-street knows, and the other two calendars are called the 'debit' and 'credit' calendars.

The British Real Time system works like this. Every month has a calendar name, for example April follows March, July follows June and so on, but the debit calendar runs one or sometimes two months ahead of this. In June (for example), you are expected to pay bills for services you will not receive until August, eg, package tours etc. And magazines like *Acorn User* come out a month in advance, to part you from your hard-won sponduliks that much earlier. The credit calendar works in reverse. When you are owed money in February, for example, the credit calendar stipulates the earliest payment date will be April. The credit calendar is normally used by large organisations, but is on occasion pressed into use by relatives.

August						1987
SUN	MON	TUES	WED	THUR	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

You can produce calendars like this

What day is it? You could always guess. Even in Cleverland we can usually identify a Sunday by the sound of lawnmowers, so there is a one in six chance we can get any other day correct. Aware of my absent mindedness (I often go to work on a Sunday), Her Ladyship bought me a Filofax, for those few moments when I am away from the computer. As I began to fill it with the 'extra' sheets, I became aware that year planners cost pounds, diaries cost pounds more, and I was forking out hard earned cash for what looked very little. So the question 'What day is it?' is quite important, and with a little ingenuity, we Acorn users can produce our own calendars with our micros.

When I asked the most junior Telford what day of the week May 7 would be, she replied without hesitation, Thursday. And she was correct. Asking her to explain this feat of mathematical expertise, she responded by saying that today was May 1 and that was a Friday, so six days time would get us to next Thursday.

OK, so considering the regularity of the seven days of the week, we can invent a simple mathematical formula to identify the day of the week without a calendar:

Take today's date from the date you are looking at:

May 28 – May 1 = 27 days

Now divide that answer by seven and take the remainder:

27 / 7 = 3 r 6

Now number the days of the week from zero (Sunday) to six (Saturday) and find the number representing today:

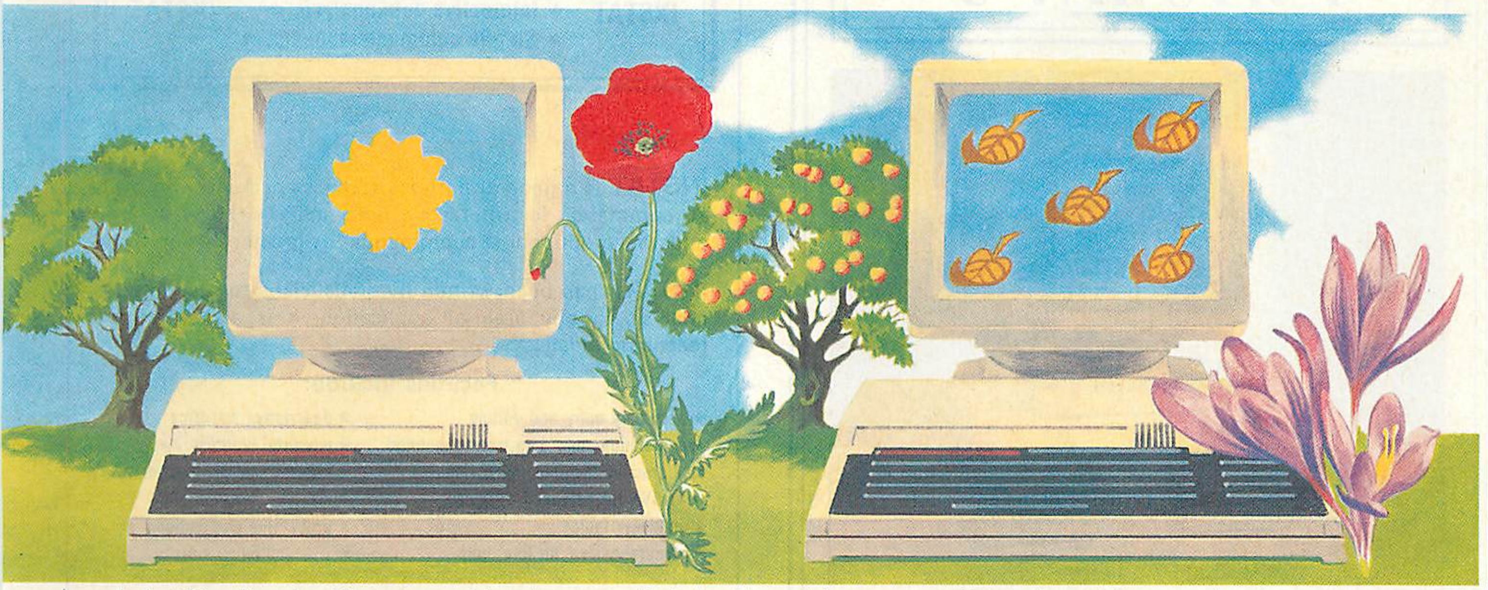
Today = May 1 which is a Friday and is day five of the week

Add the remainder and the day of the week together and divide again by seven, and take the remainder.

5 + 6 = 11: 11/7 = 1 r 4

Which day of the week corresponds to that

ILLUSTRATION BY ROY KNIPE



remainder? Day four is a Thursday so May 28 therefore must be a Thursday.

All that we required was the day of the week of the start date, which we will call the base date. For mathematicians amongst our readers, the formula in Basic pseudocode looks like this:

Day of week = (targetdate − basedate + basedayofweek) MOD 7

The important thing is for the difference to be calculated in days. This is simple within any one month, but what about between months? What about between years?

We cheat. Not a lot, but selecting a good base date can make calculations simple. Take the date December 31 1986. This can be regarded (with mathematical licence) as January 0 1987. So January 0 1987 was a Wednesday – day three. How do we change our strategy to find which day May 28 is now?

The instructions above are still OK, but we need to take account of the number of days in each month. Using the table in Figure 1 we can see that the number of days since the base date is 148, and therefore May 28 is a Thursday.

With January 0 1987 as the base date, we can calculate days of the week far into the future. We do, of course, have little problems, like taking the length of a year into account, and with the regular occurrence of leap years. How to find out what day of the week March 1 1988 will be is shown in figure 2.

Now look at listing 1 in the yellow pages. This is a day of the week predictor. To make the program more useful, the base date is January 0 1700, a Monday. Hence in PROCsetup, we set basedow% (base day of week) to be a one. To cope with days of months and running totals we read the days in each month into a two column array called date% and keep a running total in the second column.

Enter the program and save it as 'DAYDATE'. Run the program and decide on the date you wish to examine. Any date after January 1 1700 is acceptable. Type the year you wish to see, press Return and then type the number of the month. Follow this with Return and enter the date in that month. Press Return a and the day of the week will be displayed in a few moments. To keep readers on their toes, I have deliberately *not* prevented the entry

	Days	Total
January	31 days	31 days
February	28 days	59 days
March	31 days	90 days
April	30 days	120 days
May	28 days	148 days

(NB: We only need 28 days in May)

SO targetdate − basedate = 28 May − 0th Jan = 148 days

day of week = (148+Wednesday) MOD 7 = (148 + 3) MOD 7 = 151 MOD 7 = 4 = Thursday

Figure 1. Calculating the base date

0th Jan 1987−0th Jan 1988=365 days
Jan+Feb+Mar=31+29+1=61 days
base day of week=Wednesday=3 days
Total=429 days
429 MOD 7 = 2 = Tuesday

Figure 2. Example calculation

of silly dates like February 34. A routine to check these could be added.

DEFPROCdodays is the main procedure which resembles our earlier calculations. The complex measurement of the date between the target date and January 0 1700 is performed in FNelapsed. Here the sequence of events is as follows:

- Calculate the number of years between 1700 and the target year.
- Add to this the number of days in the monthly running totals up to the beginning of the month in question.
- Loop through every year from 1700 adding an extra day for leap years.
- Subtract one day if the target day is in January or February of a leap year.
- Add the date in the month and return to PROCdodays with the elapsed time in days having been calculated.

This program provides the basis for a wide range of calendar programs, but it is important to understand how the day of the week and specific dates can be linked.

If we wish to generate a calendar for a whole month (eg, the printout shown on page 88), then we have to connect the first of that month with a weekday. This means that part of the program finds the weekday, just as before, and then the whole month is displayed by simple arithmetic.

Enter listing 2, and save it perhaps using the name 'CALEND'. Now run it and enter the year for the calendar and press Return. Next enter the month as a number from 1 (January) to 12 (December) and again press Return. The program asks whether a printout is needed, and this is decided by simply pressing Y or N. The Return key is not necessary. After a pause the calendar for the selected month is printed out.

'CALEND' uses some parts of listing 1, but they are not identical. The PROCdodays procedure is now looking for the weekday associated with the first of the month. This is shown by the 'one' being

passed in FNelapsed. The part of the program which generates the calendar, once the start day is found, is DEFPROCprintdays. This works like so:

- A day counter is set up, beginning with the first day of the week of the start of the month in question.
- The length of the month in days is found from the look-up table, and altered if the month is February in a leap year.
- The VDU.command either activates the printer (VDU2) or ignores it (VDU3).
- The month and year are printed and then underlined.
- A loop prints each date in turn, and an IF command ensures that a new line starts each week.
- The whole month is finally underlined and the program stops.

The precise layout of the calendar is partly controlled by the Tab statements of PROCprintdays, but also by the setting of the zone variable – @% which is set to give five spaces for numbers. The program resets it to its normal setting after each month, but beware of problems in your other programs if you escape half way through the calendar.

Well, we've got a one-month calendar, and the whole year can be done by running the program 12 times and entering the date over and over. Listing 3 can be used to speed up the production of a calendar. Enter it and *SPOOL it to disc like this:

```
*SPOOL TEMP
LIST
*SPOOL
```

Now load listing 2 and *EXEC the spooled file like this:

```
*EXEC TEMP
```

It should replace lines 10 – 190 of 'CALEND'. The new program can be saved as normal – call it 'YEARCAL'. When this program is run, we simply enter the year for the calendar, and press Return. Press Space whenever the next month is needed, and the whole year is printed out.

Enter listing 4 and again *SPOOL it. Now load 'CALEND' (listing 2) again and *EXEC the spool file. Providing your line numbers match, you will have converted 'CALEND' to be a monthly planner producer. Save it as 'PLANNER'. The result will be figure 3, a monthly planning sheet. *PLANNER* is really only useful if you have a printer.

There was an enjoyable piece of programming in the new version of PROCprintdays, where we look at the date to produce the correct ending as in first, second, fourth etc. Again keeping you on your toes, you should add one line to cater for a single date in each month which I've deliberately left out. Look at figure 3.

Increasingly, the trend with serious computer users is towards the graphics type front-ends available on the Macintosh and GEM. The new Acorn micro Archimedes also includes this kind of feature (see the major feature on page 11). A couple of issues ago we released the *Jottings Operating Environment (JOE)*, a graphics front-end for the Master series. It came complete with a calculator, based on an earlier Jottings. A number of people have asked for futher desktop accessories for the *JOE* and listing 5 is the first. It is designed to be stand-alone but can easily be configured to fit the *JOE* desktop. This application makes use of the Master's real-time clock, so readers without a Master will need to make modifications to the program.

```
August                         1987
-----------------------------------
 SAT  1st.
-----------------------------------
 SUN  2nd.
-----------------------------------
 MON  3th.
-----------------------------------
TUES  4th.
-----------------------------------
 WED  5th.
-----------------------------------
THUR  6th.
-----------------------------------
 FRI  7th.
-----------------------------------
```

Figure 3. The planner output

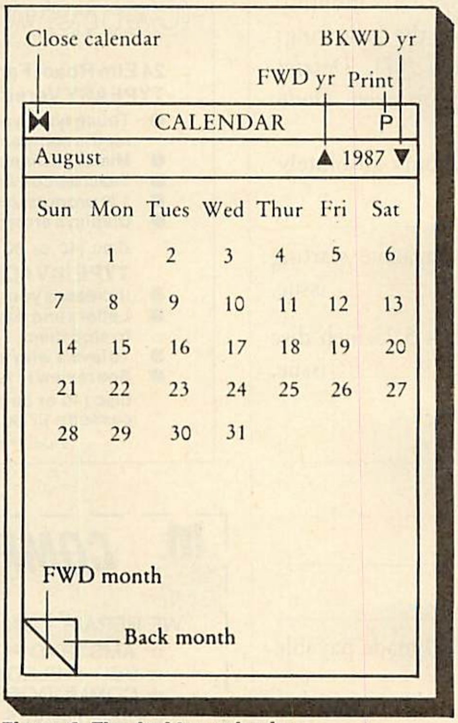


Figure 4. The desktop calendar

Whether we use this as a stand-alone system or as a part of the *JOE*, the method of use is the same. Enter listing 5 and save the program – call it 'JOECAL'. Run the program and a calendar pad showing the current month should appear, along with a pointing arrow cursor. The pointer will move using the cursor keys and speed up when Shift is pressed simultaneously with the cursor keys. Figure 4 shows the key areas of the pad, which can cause actions to occur, when the pointer is over them and the Return key is pressed.

The 'butterfly' icon on the top left of the pad is the off switch. The 'P' icon on the top right is the print-copy button. The arrows near the year change the year displayed. The bent page edge icon at the bottom left serves two purposes. The first is to turn to a new month. Do this by pointing to the sheet under the one displayed and press Return. To go back one month, point to the folded over corner and press Return.

When the 'P' icon is clicked, a button box appears asking the user to confirm that printing is required. Move the pointer to the appropriate button and click. If the printer is set up, then the current month will be printed. If the printer is not ready, then an error message will appear, and the program will recover.

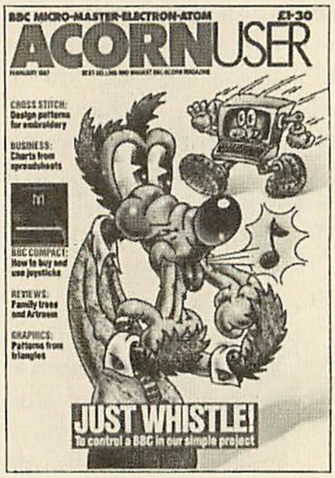
To use the calendar with the *JOE* desktop, first delete the mode 128 at the beginning of the 'JOECAL' program. Next find the line ending *BASIC and replace the *BASIC with CHAIN "JOEVDU". Now save the modified program in the ADFS 'JOE' directory as 'CALENDAR'. Next load 'JOETOP' and look for the calculator handling routines. There will be three lines: one to print the topline 'calculator' word, one to check when the pointer is over the word, and one to CHAIN the calculator. Simply add three extra lines to do the same for the calendar. You might have to use the word 'Date' on the top line because of space.

Most of the routines inside the desktop calendar are common to the *JOE* system or to the earlier calendar programs previously outlined. The variable M% should be left set to zero. If you have any Acorn VFS chips available, (discussed last month) and a three button mouse or trackerball, then set M% to one and the pointer will change shape and function from the mouse. The only button needed is 'execute' (left-most mouse button). This little known filing system from the Domesday interactive video system is really amazing! See if you can pester your local dealer for a ROM. I'll be examining its facilities in more detail in a future issue.

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ONE LINE WONDERS

Our competition for one-line graphics programs produced some interesting entries. Here we have a look at the best of them

Robert Miller

In the March issue of *Acorn User*, we ran a competition to write a single-line Basic program to produce an attractive graphics display. Many of you had a go, and the winners were listed in the June issue. But for those of you hungry for more details, we've decided to tell you the secrets of some of the most successful programs.

The colourful displays produced by your programs can be divided into two classes: animated screens and static displays.

Moving displays

The main method of producing a moving display (the only one in fact employed in entries received) is by use of 'palette bashing'. In more technical terms, this means the use of the VDU 19 command to change colours directly on the screen.

The winning entry from Duncan Rowland used this technique, as did about a third of the others.

To achieve such a display, all 'moving parts' must first be drawn on the screen using each of the machine's colours in turn. Next, all colours are set to black, effectively turning them off. By switching each colour on and then off (setting it to white and then black), each part is shown successively. Listing 1 in the yellow pages demonstrates this method with a 'rope-light' type display.

Another less obvious way of achieving a moving display is by hardware scrolling. This is present on all machines (though in a limited form on the Electron), but it usually requires a detailed knowledge of the 6845 video-controller chip. My example, in listing 2, uses the VDU 23,7 command available on both the Master 128 and Master Compact machines.

The program appears to show a wave moving up and down, but in fact, constantly scrolls the wave right. This method, although effective, is very limited, as all plotting must be kept to a width of one character on the left-hand side of the screen. Don't let this put you off, as some impressive displays can be achieved using scrolling.

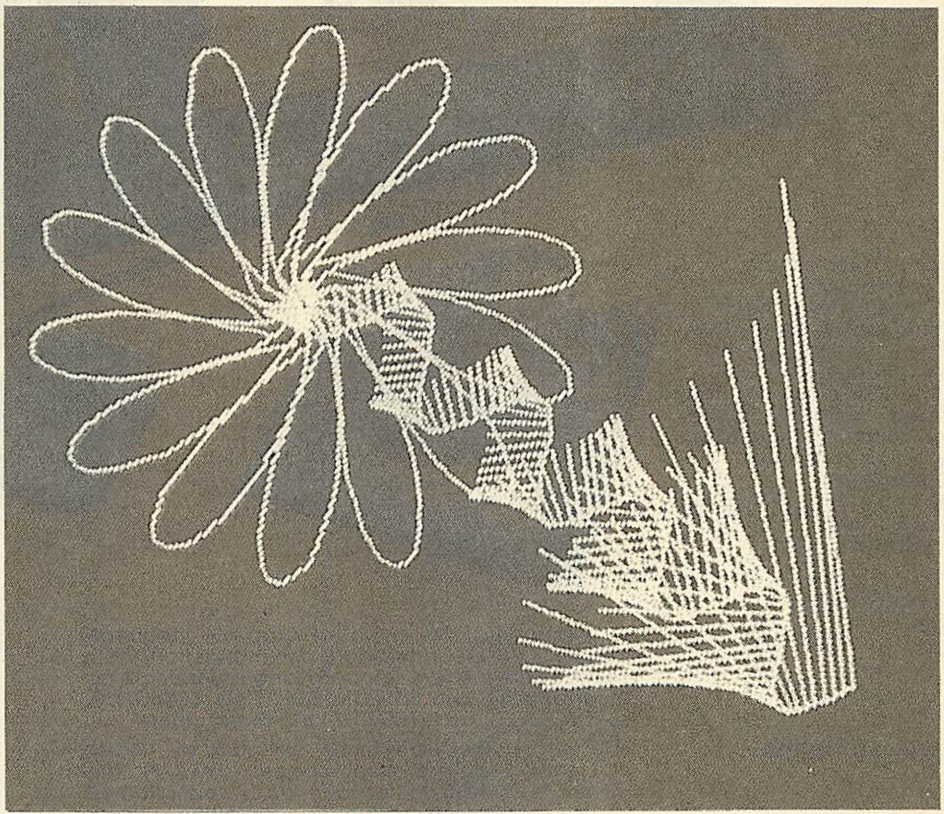


Figure 1. A flower drawn by the program by J Young

Static displays

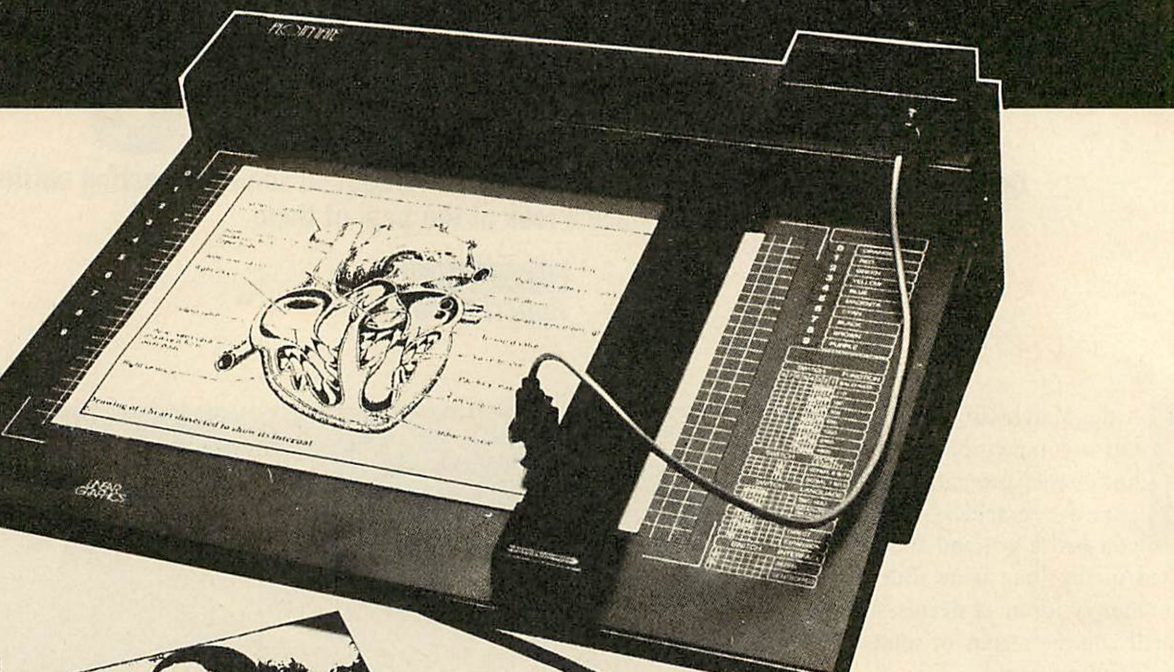
Last year (May 86) we published the article 'Join the Mandelbrot Set'. This article explained the theory behind Mandelbrot graphics and gave a program which explores the set. The program took about four hours to complete its calculations. One of J Greening's entries produced a mode 2 display of the Mandelbrot set (see over) in just 1 hour 10 minutes; and all within a single line program!

'Persian Carpets' were popular, with a fine example from R Weir (see over). Simply by drawing a series of lines from the centre of the screen to all points on the periphery, an attractive and apparently complex display can be built up. Mr Weir's program used yellow, black and red successively to highlight the curves. Monochrome 'carpets' can be equally as impressive, particularly in the high resolution of mode 0.

The best of the other static displays relied on some form of mathematical equation. A simple, but nevertheless impressive, 'Flower' program from J Young (see figure 1) uses

PLOTMATE

A Graphic Illustration



BITSTIK I & II compatible

'Plotter' is too simple a word to describe PLOTMATE. It is, in effect, a highly sophisticated data communications device that greatly extends a micro system's options and capabilities allowing high resolution input and high definition output. It is compatible with all leading micros including the BBC, IBM, AMSTRAD, ATARI and NIMBUS.



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two curves to achieve a 'string and nails' type display.

We were surprised that there were no interactive entries. This might have been due to the amount of the single line taken up by checking the input. Interaction (the ability to influence the output of a program while it is running) can be used to good effect, and allows a large range of screen displays to be generated by the same program. One example by Graham Bell (see right) allows the user to type in a set of numbers that are the parameters for an equation. The final output resembles a kind of Moorish mosaic pattern. Try 41, 39, 5, 4 and 2 as the beta1, beta2, gamma, alpha and modulus parameters.

With such good entries, I was very surprised to see that no one had made use of the extended graphics facilities present on the Master series or BBC micros fitted with the GXR ROM. They are very useful, especially when speed is needed (drawing filled-in circles for example) or when memory is tight.

There are a number of limitations to consider when writing one-line programs.

The length of your creation is the most obvious example, but there are those which are not so immediately apparent. A common structure that might be used is the conditional command IF . . . THEN. If the condition part is not satisfied, it causes the program to disregard the rest of the line and pass control to the next line. This is obviously no use as there is only one line in the whole program! There are two ways round this problem.

The first of these is to include the ELSE instruction in the structure. This will then pass control to the rest of the line should the condition be found to be false.

The second method is to use 'truth values'. As an example consider how to test whether certain keys have been pressed. Suppose, for example, you wished the variable X% to increase when 'X' was pressed and decrease when 'Z' was pressed. Using the 'IF . . . THEN . . .' structure, it might look like this:

```
A$=GET$
IF A$="X" THEN X%=X%+1
IF A$="Z" THEN X%=X%-1
```

The 'IF . . . THEN . . .'s can be eliminated and the lines can be merged into one. The resulting program would be as follows:

```
A$=GET$
X%=X%-(A$="X")+(A$="Z")
```

The above example works because, when an expression like (A$="X") is true, it gives a value of −1 (ie, (1=1)=−1) whereas, when the expression is false, a value of 0 is given ((1=2) =0). So if A$ is 'X', then the equation becomes:

X% = X% −(−1)+(0)

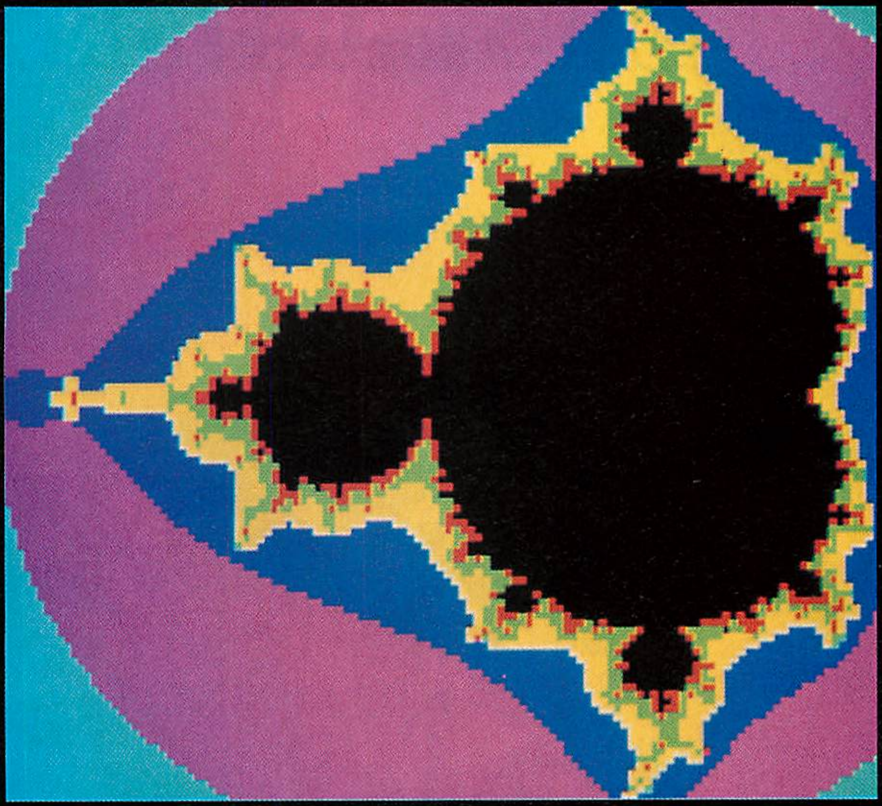
Finally, star commands are a problem, because all text following the '*' is treated as one entity. This can be solved by using the OSCLI command instead.

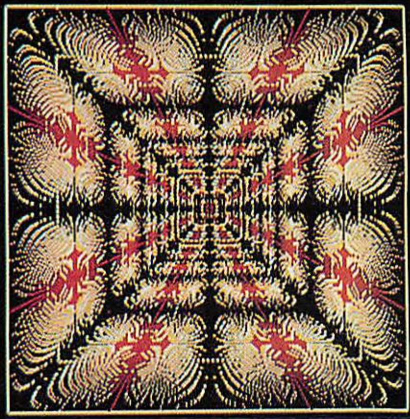
It's interesting to experiment with one-liners and see just how much you can fit in. After a time you should become quite skilled in cramming the maximum amount of code into the smallest amount of memory. Although your program becomes almost unreadable, it's the final product that others will see. So throw caution to the wind and get one-lining!

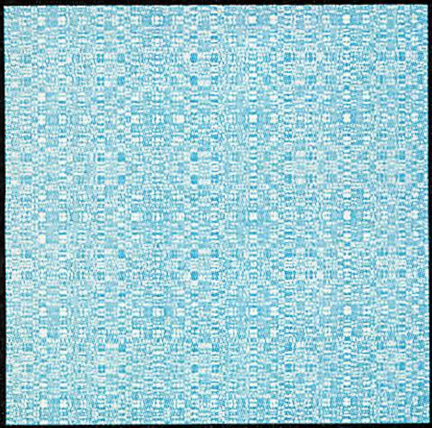
You may notice the one-line programs accompanying this article are in fact multi-lined. They all work as single-line programs, but are easier to enter and understand in multi-lined form.

I would like to see any other one line programs that readers have written or any further ideas on the subject. Maybe, if there is a reasonable response, a further one-line update might be possible in a future issue. Finally, although the theme of this article is graphics, do try other ideas in different areas.

I await with anticipation your one-line wordprocessors and spreadsheets!

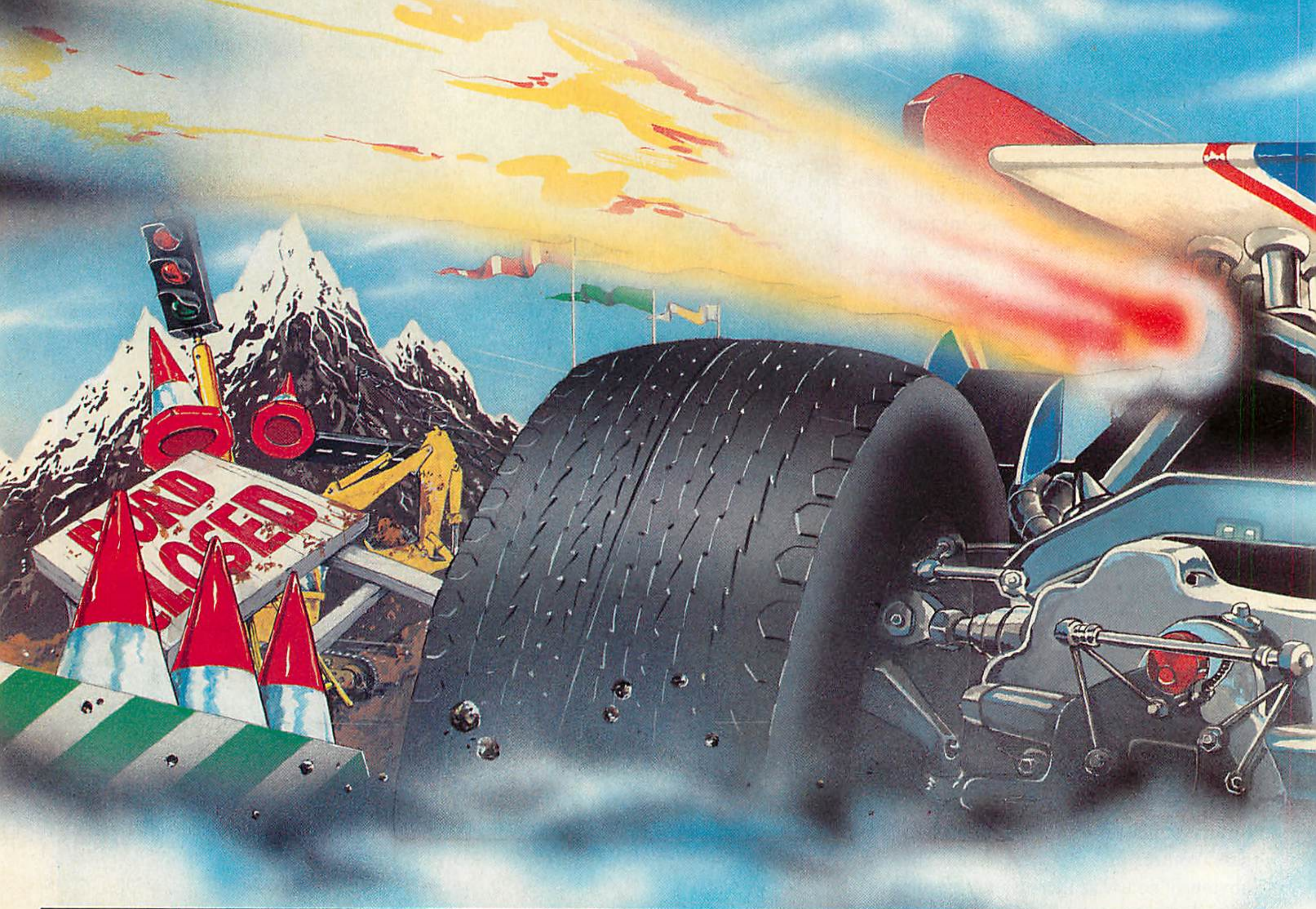


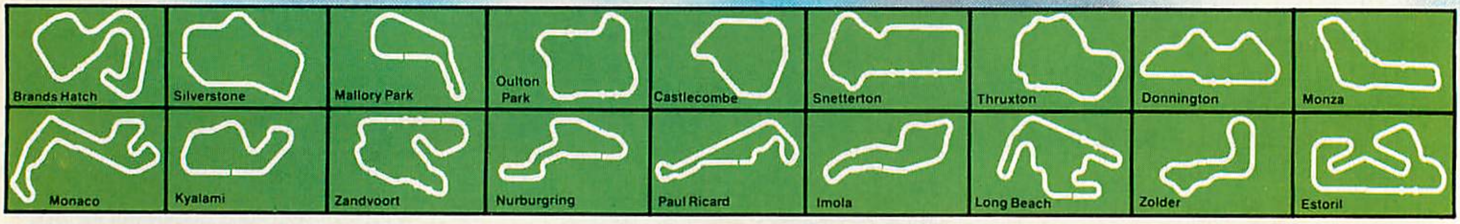




Some of the programs produced fascinating patterns. J Greening designed the Mandlebrots (top), and R Weir (left) and Graham Bell (right) the other one-line patterns

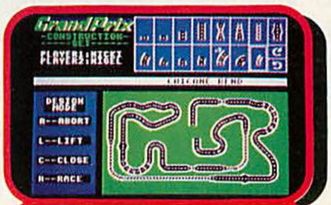
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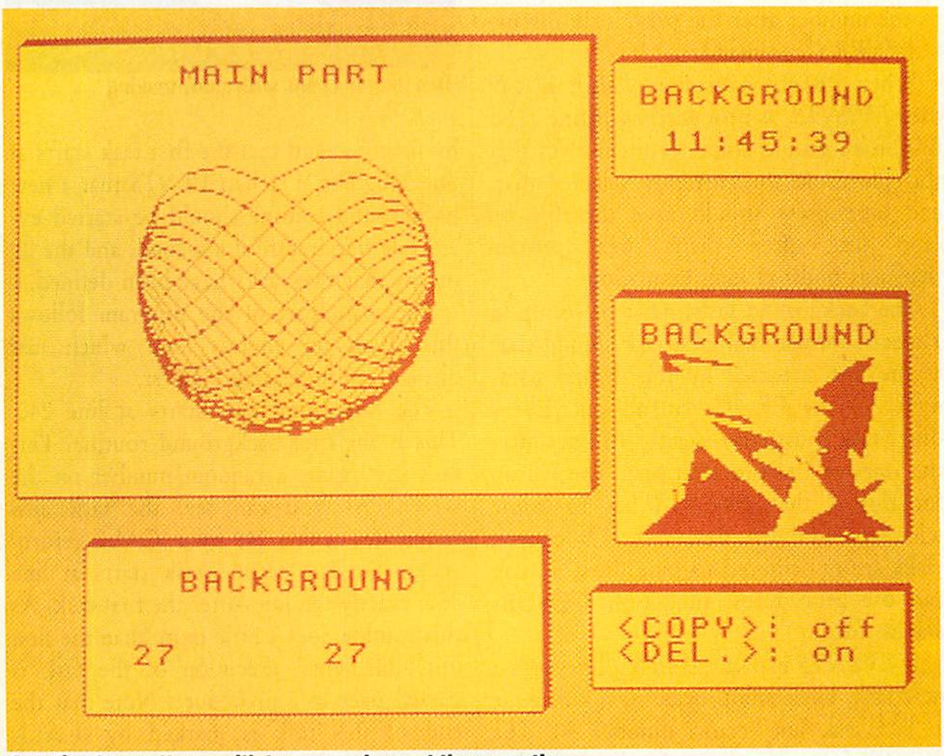
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INTERRUPTING BASIC

Your micro can run two programs at once! Double the usefulness of your computer with these listings

Mark de Weger



Creating two patterns with two procedures at the same time

Multi-tasking means that a computer runs more than one program at the same time. The computer swaps very quickly between programs, giving the appearance of running them all together. True multi-tasking requires very advanced processors and that is why it is possible only on large computer systems. Quite a frustrating situation for the dedicated programmer with only a simple microcomputer at his disposal. But as the saying goes 'if Mohammed won't come to the mountain . . .'. When Acorn developed the BBC micro, it decided that it should at least give the machine code programmer the possibility of emulating multi-tasking.

The BBC micro's operating system enables us to use events and, at an even lower level, interrupts to stop the micro in its tracks and swap programs. However, even with these tricks at your disposal, it is far from easy to emulate multi-tasking as everything has to be done in machine code. But here is a program that gives Basic programmers the same multi-tasking power as machine code programmers, in a much more user-friendly way.

Few affordable computers have the ability to truly multi-task. Most achieve a similar effect by 'context-switching'. The difference lies in whether each of the separate programs has to 'know about' the other – multi-tasking computers should protect each program from interference from the others.

This article describes a system for context-switching within Basic programs. How do we achieve this context-switching emulation in Basic? Well, first type in listing 1 from the yellow pages and run it. This program will create a machine code file called 'EVENTS'. Listing 2 consists of only one procedure, PROCeventson. Type it in, omitting the REM lines, and save it to tape or disc in the following way. Type:

```
*SPOOL PROC
LIST
```

When the > prompt reappears, type:

```
*SPOOL
```

Now there is an ASCII file of the procedure PROCeventson in a file called 'PROC'. To enable a program of yours to use multi-tasking emulation, PROCeventson has to be added to this program. Just type:

```
*EXEC PROC
```

to do this.

Before I go on, I have to correct something. This program enables you to emulate context-switching, but in fact it can do much more. In the December 1986 issue of *Acorn User* Bruce Smith wrote that a command 'that would have been worthy of inclusion in any language is EVERY'. EVERY, followed by a time interval and a command, will execute the command every time the interval elapses. The context-switcher will allow you to do exactly that. Your program may consist of one main, foreground, routine and a number of background tasks. Each background task is executed every interval.

How can you write Basic programs to implement this? As there are quite a few things to remember, a summary of the rules can be found in a separate box. First, PROCeventson has to be added to the

program you want to give multi-tasking power. Make sure the program's line numbers don't overlap with those of PROCeventson before you add. To enable the background routines, PROCeventson must be called with four parameters:

PROCeventson (address, linenr, time, nrtasks)

Here 'address' is the address at which the machine code was assembled by listing 1. If you have not changed this program, the address should be &900. 'linenr' is the line number at which the first background task starts. 'time' must be the time interval in hundredths of seconds after which a background routine is executed, and 'nrtasks' should be the number of tasks to be enabled. The variable 'time' is comparable to the number after the previously discussed EVERY command.

When PROCeventson is called, it will load *EVENTS*, as produced by listing 1. So disc users should convince themselves that this file is on the currently selected disc, and tape users should save this file on tape just after their own proram that uses multi-tasking emulation.

The background tasks must be set up in a special format. The first task should start at the line specified by the second parameter of the PROCeventson call. Every other task must start exactly 10 lines after the start of the previous one. The reason for this is that *EVENTS* has to know where to find the next task. Of course, tasks are not limited to nine lines, as you can use procedures, functions, GOSUBs and so forth.

If *EVENTS* expects to find a line with a new task, but cannot locate it, it will issue a 'bad task line' error, number 50. The most obvious reasons for this error are that either you specified more tasks than there are, or that the numbering of the task lines is wrong. The end of a task has to be marked by a 'CALL return' statement. This will cause the execution of the main part of your program to continue where it was interrupted for a background task. The variable 'return' is set up by PROCeventson, just as the variables 'eventson' and 'eventsoff' are.

Let's take a look at listing 3. This is a very simple demo that does not do anything really useful, apart from showing you how to implement background tasks in your programs. After the usual REM lines, the mode and variables are set up and three messages printed. Then PROCeventson is called. PROCeventson (&900, 240, 1, 2) means that the code was assembled at &900 by listing 1, and that the first task starts at line 240. The '1' tells *EVENTS* that a new background routine should be started every one hundredth of a second, and the '2' means that two tasks have been defined.

BASIC ROM ROUTINES

Routine	schlin	cont
Basic 1	&9942	&8BOC
Basic 2	&9970	&8B9B
Basic 4	&80CD	&9005



Two micros in one with multi-tasking

The main part of the program follows this. It is an endless loop which just displays an increasing counter.

The interesting part starts at line 240. This is the first background routine. This task just prints a random number on the screen. As you can see, the task also terminates at line 240 by a 'CALL return' statement. The second task starts at line 250, exactly ten lines after the first task. As this routine does a little more than the first one, the actual execution of the task is passed over to a procedure. Note that the end of this task is marked by 'CALL return' too.

There are a few limitations, but also some extra features. The most important limitation is that background tasks must be switched off during the execution of a procedure in the main part of your program. This is because *EVENTS* depends rather heavily on manipulation of the 6502 microprocessor's stack. When Basic encounters a procedure call, it alters the stack, so spoiling the background task.

Background tasks can be switched off using CALL eventsoff and switched on again using CALL eventson. These calls can, apart from switching background tasks off during procedures, of course also be used to switch these tasks off temporarily for other purposes. It is, however, very important that these calls are only issued in the main part of your program. Using them in a background routine is a very effective way of crashing your program! Switching off background tasks during a procedure has to be done in the following way:

```
100 DEF PROChello:CALL eventsoff
110 CALL eventson:ENDPROC
```

The CALL instructions are on the same lines as DEFPROC and ENDPROC.

When the execution of the main part of your program continues after a background routine was executed, the following information is preserved:

- The VDU status (printer on/off, paged mode etc)
- The text cursor position
- The graphics cursor position

So if a background task changes other things (eg, colours), these should be restored before the end of the task. Except for special purposes, a background task should not, of course, alter any variables that are used elsewhere in the program.

Background routines should be switched off (by means of CALL eventsoff), before your program ends. If an error occurs, they are switched off automatically.

Also, don't use TRACE when running a program that uses background routines.

The last thing you have to take care of is the following: a background routine is only executed if the time interval set by calling PROCeventson has elapsed. This time is checked only when TRACE would normally print a line number surrounded by square brackets. (The reason for this is that *EVENTS* works by intercepting the first TRACE square bracket.) So background tasks won't be executed during the following loop:

```
100 FOR I%=1 TO 100:NEXT I%
```

or:

```
100 I%=0:REPEAT:I%=I%+1:UNTIL I%=100
```

Avoid these loop constructions on one line if you want the background tasks to continue being executed. Background routines won't even be called during the following loop:

```
100 FOR loop=1 TO 1000
110 NEXT
```

If TRACE were on, Basic would print a line number at line 110 (not at line 100), but for complex reasons *EVENTS* will not execute a background routine if the previous Basic statement was a FOR. . .TO (. . .STEP) instruction. If you really need a construction as above, use the following:

```
100 FOR I%=1 TO 100:
110 NEXT I%
```

The ':' at line 100 puts a dummy instruction at the end of the line, so that a background routine is normally executed if the time has elapsed.

Listing 1 assembles the machine code program *EVENTS*. This code takes three pages of memory and it needs one page of work space. The address at which the code is assembled is given by the variable code%. The start of the work space is defined by the variable workspace% in the next line. The standard values of these variables are respectively &900 and &C00. This will cause the code and work space to overwrite the load and save buffers on tape-based machines, and the function key and user-defined character areas on non-Master micros. Tape users who want to use commands like *SPOOL, *EXEC, BGET#, BPUT#, and so on could set code% to &E00 and workspace% to &D00. This does, however, require PAGE to be set to &1100 before loading or typing in any program that makes use of multi-tasking emulation. Non-Master disc users could set code% to &1600 and workspace% to &900 if only a couple of files are opened. Whatever you decide, make sure you also change the first parameter of the PROCeventson command to the correct value of code%.

A demonstration program

Enough of the theory! Listing 4 on the yellow pages is a larger demo than listing 3. It shows you what can be achieved with multi-tasking emulation. As you can see, the structure of the program is quite similar to that of the first demo. After setting up the variables, asking you to enter the time and drawing some windows on the screen, PROCeventson is called. PROCeventson (&900, 230, 1, 4) means that the machine code was assembled at &900, the first task starts at line 230, the tasks should be executed every hundredth of a second and that there are four of them.

The main part of the program is a graphics routine, which will draw a nice pattern in the top left window on the screen. Line 160 will switch the background tasks off if the Copy key was pressed, and on again after delete has been pressed. The background routines start at line 230. PROCtime prints the time in the top right window and PROCtriangle draws black and white triangles in another one. Line 250 will print an increasing counter in the bottom left window. PROCmusic, finally, plays a note of a piece of music every time it is called. Note that all these four procedures that contain a background task are terminated with a 'CALL return' statement.

Of course *EVENTS* can be used for more esoteric tasks than just printing the time on the screen.

A more useful application is shown in listing 5. The foreground task, a graphics routine, is not important. The background task is much more interesting, as it prints an ASCII (spooled) file. This allows your main program to do calculations, while a file is printed in the background. To use the program, first create an ASCII file called 'DEMTEXT'. Note that the background routine does switch the printer on with a VDU 2 command, but does not switch it off again with VDU 3. The reason for this is that *EVENTS* restores the VDU status, which includes the printer on/off status, after having executed a background task. Listing 5 also shows you how to switch the background tasks off during a procedure called by the main part of your program.

USING EVENTS

There is quite a lot to remember if you want to use *EVENTS* so here is a summary of points to watch:

- Add PROCeventson to your program.
- Call PROCeventson (address, linenr, time, nrtasks) before the background tasks are enabled. The parameters are:

address: the address at which the machine code was assembled, given by the variable code% in listing 1
linenr: the line number of the first background task
time: the time in hundredths of a second between the end of one background routine and the start of another.
nrtasks: the number of tasks

- The line number of the start of every next task should be exactly 10 higher than that of the previous task.
- Background routines must be terminated by 'CALL return'.
- If a background task changes other information than:
  - the vdu status
  - the text cursor position
  - the graphics cursor condition

  it should restore the original settings before it ends.
- Background routines can be disabled using a 'CALL eventsoff' command and re-enabled by means of 'CALL eventson'. This should not be done in a background routine!
- Do not use TRACE.
- Switch background tasks off before your program ends.
- Disable background routines during the execution of a procedure that is called by the main part of your program.
- Avoid one-line loop constructions

I imagine you are eager to know how this multi-tasking emulation is done. But before you read on, let me warn you that the *EVENTS* program uses many 'illegal' tricks. So if you are someone who easily picks up bad programming habits, then you'd better skip this section.

The program makes use of two Basic ROM routines and directly accesses the VDU variables and processor stack.

The reason that using Basic ROM routines is 'naughty', is that there are a number of versions of Basic, and in each version the routines have different entry addresses. The *EVENTS* program is compatible with Basic 1, 2 and 4, as present in the Electron and the BBC models B, B+ and Master.

The technical details

If, after reading all these warnings, you still have the courage to read on, here is an explanation of how *EVENTS* works.

The interval-timer is used to generate events after a certain time that is set by the user. When the event occurs, the TRACE flag is set. Then when Basic executes the next line it prints the line number as if trace were on.

The '[' sent by Basic before printing a line number is intercepted using WRCHV. First a check for the return address on the stack is carried out, so that the program is sure that the '[' was sent by Basic when it wanted to print a line number, and not, for example, by a PRINT "[" statement. If the return address was that of the Basic 'print line number' routine, then the TRACE flag is switched off and a check is made on the previous instruction executed by Basic.

The return addresses are pulled from the stack and this stack data, the VDU status and the graphics and text cursor positions are saved. Then the line number of the next background routine is calculated and its address is found using a Basic ROM routine. If the line doesn't exist, an error will be generated.

Otherwise execution jumps to the background task (again using a Basic ROM routine). A background task must be finished with a 'CALL return' statement. This calls a machine code routine that restores the previously saved information and continues execution of the main part of your program, where it left off when the

original program was interrupted.

The *EVENTS* program makes use of two Basic ROM routines. The box on page 98 gives a summary. The routine 'schlin' searches for a line in a program. On entry &2A–&2D must contain the line number. If the carry flag is set on exit, this indicates with Basic 1 and 2 that the line was not found. Acorn likes confusing us, so with Basic 4 the carry is clear if the line could not be found. If the line was found, &3D, & 3E points at the last byte of the line number of the line the routine tried to find.

The second routine, 'cont', will cause Basic to continue with the next instruction. On entry, &B,&C with offset I must point to the memory location that contains the ':' or CHR$(13), which marks the end of the previous instruction.

If you would like to use Basic ROM routines yourself, the *Basic ROM User Guide* by Mark Plumbley covers only Basic 1 and 2, but is an excellent book on advanced machine code programming of the BBC micro.

Zero page workspace used by machine code

&70,71 Number of line at which main program was interrupted
&72,73 Current task line number
&74,75 Line number of first task
&76 Stack pointer store
&77 Number of background tasks
&78 Current background task number minus one
&79,&7A Temporary variable store
&7B&7F Data for interval timer
&80,&81 Text cursor co-ordinates store
&82&85 Graphics cursor co-ordinates store
&86 VDU status byte
&87 Byte mask for current graphics point
&88,&89 Basic text pointer when main program was interrupted
&8A Flag: zero if '[' and space after line number have been printed (by Basic TRACE routine), one if line number and brackets are being printed
&8B Temporary variable store

Functions and procedures

FNbasic Sets up variables for Basic
PROCassemble Assembles machine code
PROCchecksum Calculates checksum
PROCsave Saves object code
PROCsetup Sets up variables and prints message

Integers

P% Used by assembler

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background task A routine that is executed regularly when multi-tasking is emulated.
Basic ROM routine A routine in the Basic ROM. Basic is written entirely in machine code, so routines in the Basic ROM can be used by other machine code programs.
BRKV A vector through which control is passed when an error occurs.
context switching Switching between different tasks so quickly that it seems as if they are executed at the same time.
event A kind of interrupt, issued by the operating system.
EVENTV A vector through which control is passed by the MOS if it wants to generate an event.
interrupt A signal by a device to the processor. On the BBC micro it can be intercepted by the user.
interval timer Crossing zero event: an event that is issued when the interval timer, a five-byte clock, reaches zero.
multi-tasking When a processor executes more than one program at a time.
operating system (or OS or MOS) the firmware that has overall control of the computer.
OSWRCH A routine in the operating system that prints a character.
stack (6502 stack) an area of memory (page one) onto which the 6502 processor pushes/pulls data.
stack pointer A register in the 6502 that determines where on the stack data should be pushed/pulled.
trace flag A byte in zero page (&20). If this contains a non-zero value, Basic will print line numbers while a program is running.
VDU status Given by a byte in zero-page (&D0) which contains information about the display, the printer, etc.
vector A two-byte location that contains an address to which a machine code program can jump.
workspace An area of memory used by a machine code program to store data.

code% Start of machine code
workspace% Start of workspace for code
sum% Checksum, as it is calculated

Reals

basic Version of Basic
brkv Contents of brkv, &2002,3
buffer OSCLI string buffer
checksum Checksum, as it should be
clock Start address of data for interval timer
cont Basic ROM routine address
eventnr Number of the event to be intercepted
osbyte Address of operating system routine
oscli Address of operating system routine
osword Address of operating system routine
oswrch Address of operating system routine
pass Pass through assembly
schlin Basic ROM routine address
st1 Low byte of address in Basic ROM at which an instruction calls the 'print trace-line number' routine after a GOTO instruction
st2 Low byte of address in Basic ROM at which an instruction calls oswrch to print a'[' when TRACE is on
st3 High byte of this address

Main assembler labels

event Entered if interval timer crossing zero event has occured. Sets trace flag (&20)
trace Entered if OSWRCH is called through WRCHV
ok Entered if a '[' is printed
ok3 Entered if the '[' was printed by Basic 'print trace-line number' routine. Stores Basic pointers, checks if previous instruction was FOR and if so, gives control back to Basic.
no-for Otherwise no-for is entered. Pulls three bytes from stack unless previous instruction was GOTO
goto Stores vdu and cursor information
loop1 Stores 6502 stack and calculates new task line address
over Puts this address into right locations for Basic ROM routine 'schlin' and calls it. Gives error if line doesn't exist
right Entered otherwise. Adapts addresses from 'schlin' for use by 'cont' and then calls it
eventson Enables background tasks by setting up WRCHV, EVENTV and BRKV and enabling interval timer crossing zero event
eventsoff Disables background taks. Resets WRCHV, switches event and trace flag off
return Called at the end of a background task. Restores saved information and Basic pointers and then gives control back to Basic
check-for Checks if previous instruction executed was FOR. If so, carry is set
clock2 Contains data for interval timer

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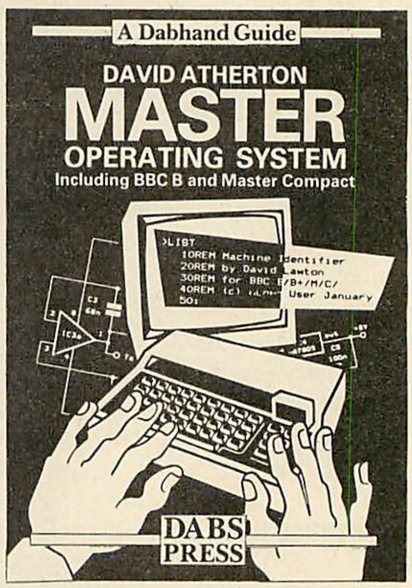
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MOS GUIDE

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Guide to Master operating system



This new book from Acorn expert David Atherton, is the definitive reference work for programmers of the BBC model B+, Master 128, and Compact computers. It also contains much a considerable amount of useful material for BBC model B and Electron users.

It covers all features of the Acorn MOS including 65C12 opcodes (including Rockwell additions), all new system calls and previously unpublished filing system notes.

The book is liberally sprinkled with program listings, which are available on disc. The *Programs Disc* also contains some extra utilities.

Please send me:

____ copies of *Master Operating System: A Dabhand Guide* at £12.95 each.

____ copies of book and 5.2-inch disc at £16.95 (£1.00 discount).

____ copies of book and 3.5/inch disc at £17.95 (£2.00 discount).

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Please allow 28 days for delivery.

COMPETITION

TAKE FIVE

Arrange ten of these words correctly in a square to form five words vertically and horizontally, and you could win Computer Concepts' spelling checker, *SpellMaster*

Graham Bell

ALIKE ABATE ABASE ABELE ABIDE ABODE ABOVE ABUSE ACUTE ADAGE AFORE
AGATE AGAPE AGILE ALIVE ALONE AMAZE AMINE AMUSE ANISE ANIMA ANODE
APACE ARISE ARENA ARETE AROSE ATONE AWAKE AWARE AWOKE AZURE
BABEL BACON BAKER BARON BASAL BASIS BASIL BASIN BEBOP BEFIT BEFOG
BEGAN BEGET BEGIN BEGOT BEGUN BELAY BELOW BERET BESET BESOM BETEL
BIDET BOGEY BOGUS BORER BORIC BORAX BORON BOSOM BOWEL BOXER
CABAL CABIN CADET CALIF CANAL CANON CAPER CARAT CARET CAROB CAROL
CEDAR CETIC CIDER CIVIC CIVIL CODEX CONIC CONEY CORAL COVEN COVER
COVEY COVET CUBIC CUBIT CUMIN DATUM DAVIT DEBAG DEBAR DEBIT DEBUG
DECAY DEFER DELAY DENIM DEPOT DETER DINER DIVAN DIVER DOMED DORIC
DOWER DUCAL DUCAT ELATE ELIDE ELITE ELOPE ELUDE ENEMA ERASE ERODE
EVOKE EXILE EXUDE FIVES FACET FARAD FATAL FELON FEVER FINAL FIVER
FIXED FOCAL GAMUT GELID GOFER GULES HAVIT HAVEN HAVER HAZEL HELIX
HERON HILUM HOCUM HOLEY HONEY HOVER HOVEL HUMAN HUMUS IMAGE
INATE INURE INANE IRATE JAKES JAPAN JEWEL JUROR KAPOK KAPUT KAYAK
LADEN LAGER LAPEL LASER LATIN LEGAL LEMON LEMUR LEPER LEVER LEVEL
LILAC LIMIT LIVEN LIVER LIVID LOCUM LOTUS LOVER LOWER LOYAL LUMEN
LUNAR LUPIN MADAM MAGIC MASON MATER MAXIM MAYOR MEDAL MELON
MERIT METAL METER MIMIC MINUS MODUS MONEY MORAL MORES MORON
MOTIF MOVER MUCUS NAKED NASAL NATAL NAVAL NAVEL NEVER NEWEL
NODUS NOMAD NOVEL OBESE OGIVE OKAPI OLIVE OMEGA OPERA OPINE ORATE
OVATE OXIDE OZONE PANEL PAPAL PEDAL PETAL PEWIT PIVOT POKER POSIT
POWER PUPIL RURAL RABID RADAR RADIX RADON RAPID RAVEN RAZOR
REBEL RECAP REFER REFIT RELIC RELAY REMIT RENEW REPAY REPEL RESET
RESIN REVEL RIDER RIPEN RISER RIVAL RIVEN RIVER ROMAN ROBIN ROBOT
ROSIN ROVER ROWAN ROYAL RULER RUNIC SALAD SALIX SALON SATAN SATIN
SAVER SAVOY SERUM SEVEN SEVER SEWER SINEW SINUS SITED SITAR SOBER
SOLAR SOLID SONAR SOWER SUGAR SUPER TABOR TAKEN TAPER TAXIS TELEX
TENOR TENET TENON TEPID TIDAL TIGER TONAL TONIC TOPIC TOPAZ TORUS
TOTAL TOTEM TOWER TOWEL TOXIN TUBER TUDOR TULIP TUTOR UNITE URINE
VALET VALID VAPID VENAL VENOM VENUS VIRUS VIVID VIXEN VOCAL VOTER
VOWEL WIVES WADER WAFER WAGER WAKEN WAVED WAVER WIDEN WIDER
WIDOW WOMAN WOMEN WOKEN WOVEN XENON YODEL YOKEL ZONAL ZONES

Printed above is a large selection of five-letter words. Representing a vowel as V and a consonant as C, some are arranged VCVCV, some as CVCVC. Five of these words can be arranged horizontally in a five by five square so that five of the other words are formed vertically as well, and so that the vowels and consonants lie in the following pattern:

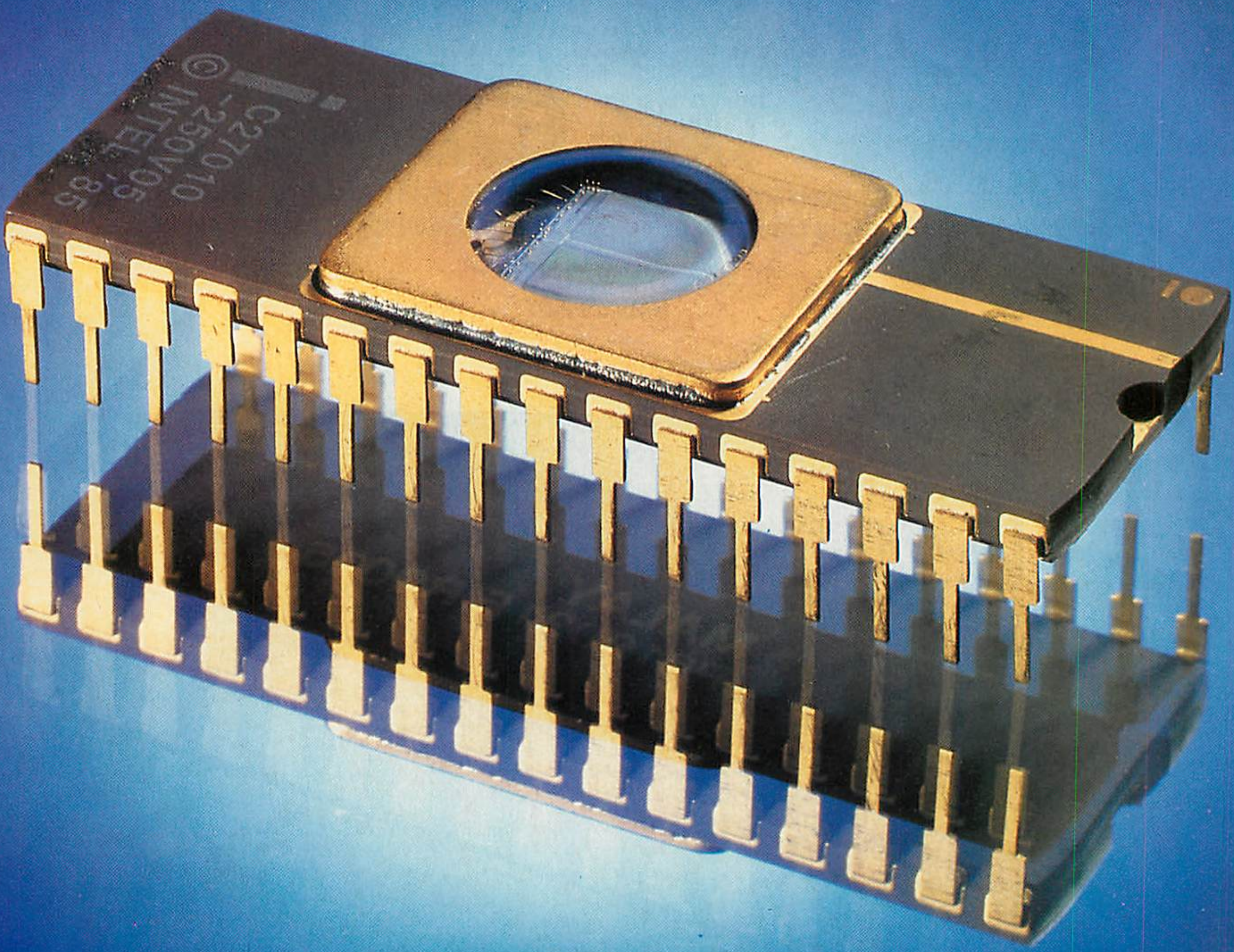
CVCVC
VCVCV
CVCVC
VCVCV
CVCVC

Each of the five horizontal words and five vertical words in the square should be different. There are two correct answers; either will do.

The prizes this month are two copies of Computer Concepts' new *SpellMaster* ROM, reviewed by Bruce Smith in last month's *Acorn User*. This spelling checker has a 60,000 word dictionary held on the ROM itself. It can check your word-processed text at the press of a single button, and is much faster than disc-based spelling programs. In fact, it's fast enough to check your spelling as you type words in! *SpellMaster* is compatible with *Wordwise, Wordwise Plus, InterWord* and, of course, *View*. Special new dictionaries of your own words can be created in sideways RAM, and these will be checked along with the main dictionary. The crossword option would be ideal for solving a competition like this!

Send your answers and the coupon at the bottom of the page to: August Competition, *Acorn User*, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF, to arrive not later than August 24. Don't forget to attach the coupon below to your entry, for without these we can't accept them. The first correct answers opened then will receive the prizes. The editor's decision is final.

ACORN USER
COMPETITION
AUGUST



SPELL Master

Spellmaster contains 59,536 separate English words stored in 131,072 bytes in one chip

- Compatible with all BBC models
- Works with INTER-WORD, WORDWISE PLUS and VIEW
- Checks spelling at up to 10,000 words per minute.
- Checks text as it is entered

SPELL-MASTER ROM

This is the first completely ROM based spelling checker in the world. As a result it out-performs all known spelling checkers on this machine or any other micro-computer. The single 128K EPROM contains over 59,000 separate words and 22K of program.

Compatible with all BBC Micros

Special switching techniques ensure that the 128K ROM appears to the machine as one single 16K ROM - this guarantees that it is completely compatible with the ROM sockets in all versions of the BBC Micro- computer.

Compatible with all the major word processors

SPELL-MASTER has been designed to fully integrate with the most popular word processors on the BBC, WORDWISE and WORDWISE PLUS, VIEW and of course INTER-WORD. While editing in these word processors all that is necessary to control SPELL-MASTER is to press one CTRL key (Usually CTRL-J). This causes a menu to appear listing a variety of options such as 'Check entire text', 'Check word at cursor', 'Continuous check - on/off' etc. Text is checked directly in memory while in the word processor. There are even short-cuts to the menu, for example, pressing CTRL-V in any of the above word processors will start checking the text immediately from the current cursor position. Compare this with the process of checking text in the most highly rated competitive product - VIEWSPELL.

VIEWSPELL	SPELL-MASTER
•Save text from word processor. •Enter spelling checker. •Load text into spelling checker. •Check the text. •Go back to word processor. •Load marked text. •...finally, make corrections.	•Press CTRL-V • make corrections.

Check entire text

In a word processor, SPELL-MASTER can check at up to 10,000 words per minute. Whenever a word is indicated as misspelt the user is given three simple choices. Replace the word with another selected from the dictionary, ignore the word altogether or add it to a user dictionary.

Check as you type

Because the dictionary is ROM based it is possible to check words as they are typed. This feature works with all the above named word processors and does not slow the operation of the word processor at all. Whenever an incorrect word is entered the computer will bleep; the word may then be corrected or simply ignored.

User Dictionaries

SPELL-MASTER supports extensions to the main dictionary in sideways RAM or ROM. This has the advantage that there is no speed degradation when checking against user dictionaries, since there are no disc accesses required at all. Once a word is added to a user dictionary it is treated as if it is present in the main dictionary.

SPELL-MASTER can support a number of separate dictionaries at once, each sideways RAM or ROM holding up to 3000 additional words. Once a dictionary has been created it can be 'burned' into an EPROM to form a permanent extension to the main dictionary.

Provision is made for editing any dictionary extension, for adding or deleting words in bulk, and directly loading or saving user dictionaries from or to sideways RAM.

Additional star commands

These can be issued from any language ROM such as spreadsheets or BASIC (they can even be included into BASIC programs). Some of the 8 commands are:

*CROSSWORD - Will search the entire dictionary for words that exactly fit the search pattern. For example *CROSS. ##M#U#ER would list ARMOURER, COMMUTER, COMPUTER. It takes about 8 seconds to check against all 59,000 words.

*ANAGRAM - Will list all the words in the dictionary that contain the same letters as those specified.

*FUZZY - Will list all words that sound something like the one you are searching for. If you are not sure of the spelling of a word then entering the approximate spelling here will generally list the word you are looking for.

Price: £59.00 incl.

Upgrades

Owners of the older two chip versions of SPELL-MASTER can upgrade to the single chip version for £25.00. However this new version is functionally equivalent and so it should not be necessary to upgrade.

2nd processors

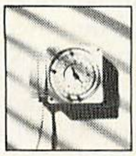
Due to its unique design SPELL-MASTER will not work with word processors running on the 6502 2nd processor, although there are facilities provided for checking long text files.

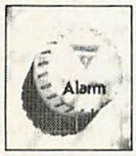
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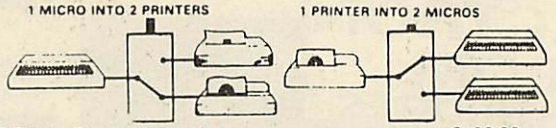
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BBC Printer 2 to 1 (Inc Lead)	@ £ 30.00	34.50d
BBC Printer 6 to 1	@ £ 71.00	81.65d
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Centronics 4 to 1 (Inc Lead)	@ £ 70.00	80.50d
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£30 5¼ inch Disc (ADFS ONLY) **£34** 3½ inch Disc
With Digimouse add **£35**

The ARTROOM pack consists of ARTROOM and ACE (Artroom Colour Extension). ARTROOM is an icon based full screen graphics package which can be controlled by mouse or keyboard. All the usual features are there including 'cut and paste' and our highly acclaimed ZOOM option plus an extensive graphics library to help you produce pictures quickly. An advanced printer dump is also supplied.



'ARTROOM...the best there is.'— Acorn User Feb '87

'ARTROOM is the software for you.' A & B Jan '87

ACE consists of two programs. COLOURIZER enables you to produce MODE 1 colour versions of ARTROOM screens and to dump them to a printer using a shaded printer dump. The MODE CONVERTER program will convert any graphics screen into a Mode 4 ARTROOM screen ready for loading into ARTROOM. Conversions can be made from Modes 0,1,2,5 and 7, yes SEVEN!

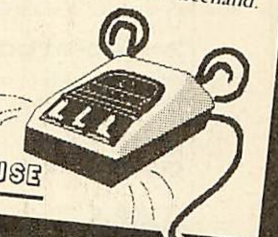
...very pleased with the way Clares have introduced the colour facility.' A & B June '87.

ARTROOM and ACE will work with any mouse but we recommend DIGIMOUSE because it is well engineered using a non-slip ball and optical encoders. DIGIMOUSE also includes the unique 'LINEAR LOCK' facility that enables you to draw straight lines freehand.

...impressed by Nidd Valley Digimouse' A & B June '87

This complete package is marketed by Olivetti in Italy, the home of style and design.

ACE A STROKE OF GENIUS!



DIGIMOUSE

BETA-BASE — SAVE £7

BETA-BASE
BETA-BASE
BETA-BASE

£30 5.25 inch Disc £34 3.5 inch Disc

The Beta-Base pack consists of Beta-Base, the number one database for the BBC micro, and Beta-Base Utilities which extends the power of Beta-Base.

The main feature of Beta-Base is its ease of use which is achieved without sacrificing the power and flexibility required for the efficient manipulation of up to 65,000 records.

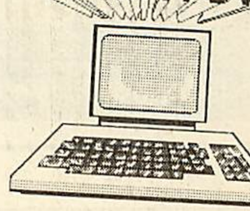
The Beta-Base Utilities provide seven new utilities. There are more powerful versions of Search and Sort and there is also a Mail Merge program which creates perfectly formatted letters containing data from your files.

'We use Beta-Base ourselves' Mike Bibby, Editor of MICRO USER.

'Rated best value for money'—ACORN USER Dec '84

RAMROD





UTILITIES PACK
SAVE UP TO £30

£50 5¼ inch disc £60 ROM £54 3½ inch disc

The UTILITIES PACK consists of RAMROD and MACROM. RAMROD is the ultimate toolkit ROM and it is compatible with the whole BBC range and includes a disassembler plus editors for DFS, ADFS, RFS, memory, Shadow memory, Sideways RAM, Tube plus lots more. RAMROD will take you to the furthest reaches of your machine and enable you to boldly go where no ROM has gone before!

'an ingenious collection of utilities...' BEEBUG Oct '86
'worth its weight in gold.' A & B Jan '87

MACROM is a fast full featured MACRO ASSEMBLER that allows the use of macros, which are loaded from disc. MACROM has its own easy to use editor which automatically formats your source code. A HI version of MACROM is supplied for use with the second processor. A macro library and demonstrations are also supplied.

'Full marks for an excellent product.'—BEEBUG JUNE 1986

We are also making BROM+ available under this offer. Its main feature is the full scrolling BASIC editor which allows the user to edit a program as if dealing with text in a wordprocessor. There are many other features dedicated to making life easier for BASIC programmers.

'This is the best BASIC screen editor I have so far used.' —MICRO USER August 85

For BROM+ add £25 on ROM, £20 for 5.25 inch disc or £22 for 3.5 inch disc.

When ordering please state the following:
Machine
Disc size (5.25, 3.5)
Disc format (40 or 80)
DFS version

N.B. If ordering for a Master or Compact please state DFS or ADFS. The ARTROOM pack is for the Master or Compact only but all other software is available for all machines.

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£30 5¼ inch Disc **£34 3½ inch Disc**

The FONTWISE+ pack contains FONTWISE+, the FONT EDITOR and 22 fonts. FONTWISE+ enables you to print very high quality text in a choice of 22 different fonts and 3 sizes. You do not need a special printer, just an EPSON RX or FX compatible. High quality is not the end of the story because you can also have both proportional and justified text. The output has to be seen to be believed.

FONTWISE+ is compatible with WORDWISE, VIEW, INTERWORD, MINI OFFICE II and EDWORD II.

'FONTWISE is better than many NLQ packages'—ACORN USER Sept '86

The FONT EDITOR is very easy to use and allows you to edit the current fonts or create new ones. Reviewers have praised the editor for its ease of use and faultless presentation.

'editor is impressively quick, smooth and easy to use'—A & B
EDITOR '...puts all previous designers to shame.'—BEEBUG July '86

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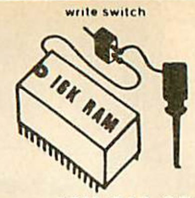
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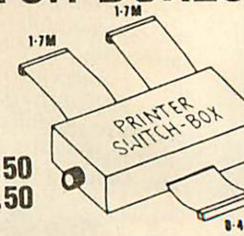


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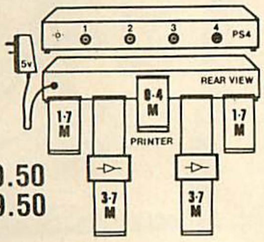
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YELLOW PAGES

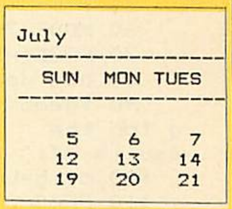
INDEX/COMPATIBILITY

Entering listings

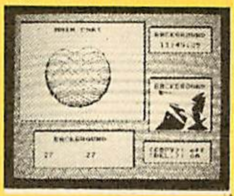
To make the task of entering listings easier, *Acorn User* has adopted several standards in the yellow pages. Programs are listed with line numbers in increments of 10, so type AUTO <Return> for automatic line numbering before you start. Before you list what you've entered, type LISTO 1 <Return> to provide spaces after the line numbers. Programs in the yellow pages are often listed to a width of 40 characters, so type MODE 6 <Return> before you start. Comparing the line-endings of your listing with the yellow pages will help you spot extra or missing characters.

To make sure that the program you want to enter will work on your particular machine, check the index below. All the listings work with Basic 1, 2 and 4 (unless stated otherwise) and with operating systems OS1.2 or above. If a program is accompanied by an article, please read the article first. If special care is needed when entering, we provide an easy-to-complete 'How To Enter' box.

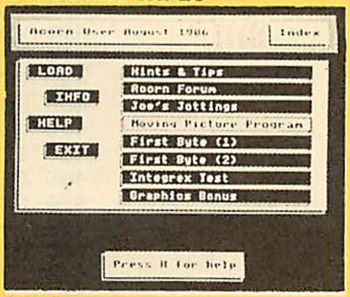
Once you've typed in your program, save it to tape or disc then test it by running it. If you have a major problem with a listing, ask someone to check it. If you still have difficulties, you can also send off for a list of *Checksums* which help you find the errors. Send a large sae (26p stamp) to *AU*Checksums, PO Box 641, London NW9 8TF.







DISCS AND TAPES



All the listings on these pages can be found on this month's listings disc or cassette. See page 131 for details of how to order.

BACK ISSUES





For help with entering and debugging listings see the following back issues: April '86, June '85, Aug '84, Sept '83.

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly T/D
Acorn Forum	114										
Listing 1		■	■	■	■	■	■	■	■	■	■
Listing 2			■	■		■	■	■	■	■	
Listing 4		■	■	■	■		■	■	■	■	■
Hints & Tips	115										
Listing 1			■	■	■	■	■	■	■	■	■
Listing 2,3		■1	■1	■1			■	■	■	■	■
Joe's Jottings	116										
Listing 1-3		■	■	■	■	■	■	■	■	■	■
Listing 4		■	■	■	■		■	■	■	■	■
Listing 5		■	■	■		■	■	■	■	■	■
One Liners	121										
Listing 1,2,4-14		■	■	■	■	■	■	■	■	■	■
Listing 3				■	■		■	■	■	■	■
Interrupting Basic	124										
Listing 1-5		■	■	■		■		■	■	■	■
Business	128										
Listing 1		■2	■2	■		■2	■	■	■	■	■
Listing 2,3		■	■	■	■	■	■	■	■	■	■

Notes: 1. Listing 3 requires *Wordwise Plus*. 2. Requires *View*.

See Acorn Forum, page 53

Listing 1. Text compression

```
   10 REM Text Compression
   20 REM by Jonathan Temple
   30 REM for B/B+/M/C/E
   40 REM (c) Acorn User August 1987
   50 :
   60 MODE 7
   70 PROCinit
   80 DIM demo 100
   90 $demo="A short demonstration strin
g for the    compression routine gives r
esults of:"
  100 orig=LEN($demo)+1
  110 PROCcomp(demo,demo)
  120 comp=N%-demo+1
  130 PRINT 'FNdecomp(demo)
  140 PRINT ''"Original length:   ";orig
  150 PRINT "Compressed length: ";comp
  160 PRINT '"Compressed to ";INT((comp/
orig)*100);"% of original"''
  170 END
  180 :
  190 DEF PROCcomp(M1,M2)
  200 M%=M1:N%=M2-1:B%=1
  210 REPEAT
  220 C%=?M%:M%=M%+1:S%=0
  240 REPEAT
  250 P%=INSTR(C$(S%),CHR$ C%)
  260 S%=S%+1
  270 UNTIL S%=4 OR P%>0
  280 IF P%=0 PRINT "Character ";CHR$ C%
;" not valid.":END
  290 IF S%>1 PROCst(11+S%)
  300 PROCst(P%-1)
  310 UNTIL C%=13
  320 ENDPROC
  330 :
  340 DEF PROCst(V%)
  350 B%=B% EOR 17
  360 IF B%=16 N%=N%+1:?N%=0
  370 ?N%=?N% OR V%*B%
  380 ENDPROC
  390 :
  400 DEF FNdecomp(M%)
  410 B%=1:R$="":M%=M%-1
  420 REPEAT
  430 C%=FNread
  440 S%=0
  450 IF C%>12 S%=C%-12:C%=FNread
  460 R$=R$+MID$(C$(S%),C%+1,1)
  470 UNTIL S%=3 AND C%=15
  480 =R$
  490 :
  500 DEF FNread
  510 B%=B% EOR 17
  520 IF B%=16 M%=M%+1
  530 =(?M% AND B%*15) DIV B%
  540 :
  550 DEF PROCinit
  560 DIM C$(3)
  570 C$(0)=" etaoinshrdlu"
  580 C$(1)="bcfgkmpqvwxyz.,;"
  590 C$(2)="ABCDEFGHIJKLMNOP"
  600 C$(3)="QRSTUVWXYZ:?!'"+CHR$34+CHR$
13
  610 ENDPROC
```

Listing 2. Extended plot vector

```
   10 REM Extended Plot Vector
   20 REM by Alistair Shimmin
   30 REM for Master/Compact
   40 REM (c) Acorn User August 1987
   50 :
```

Continued ▶

◀ Acorn Forum listing 2 continued

```
   60 DIM code% &100
   70 FOR I%=0 TO 3 STEP 3
   80 P%=code%
   90 [OPT I%
  100 BCC incorrectcall
  110 CMP #28
  120 BNE incorrectcall
  130 JMP okcall
  140 .incorrectcall
  150 JMP exit
  160 .okcall
  170 .correctcall
  180 LDA &31C
  190 STA lo
  200 CMP #32
  210 BCC exit
  220 LDA &31D
  230 BNE notzero
  240 LDA lo
  250 .notzero
  260 STA hi
  270 LDA #&89
  280 STA &A9
  290 LDA #&00
  300 STA &A8
  310 LDA lo
  320 STA char
  330 LDA char
  340 SEC
  350 SBC #&20
  360 TAX
  370 BEQ space
  380 .multloop
  390 CLC
  400 LDA #8
  410 ADC &A8
  420 STA &A8
  430 LDA #0
  440 ADC &A9
  450 STA &A9
  460 DEX
  470 BNE multloop
  480 .space
  490 LDY #0
  500 .outerloop
  510 LDA #8
  520 STA count
  530 LDA char
  540 JSR &FFEE
  550 LDA #32
  560 JSR &FFEE
  570 LDA char
  580 JSR printdec
  590 LDA char
  600 CMP hi
  610 PHP
  620 INC char
  630 .loop
  640 LDA #ASC","
  650 JSR &FFEE
  660 LDA (&A8),Y
  670 JSR printdec
  680 INY
  690 DEC count
  700 BNE loop
  710 JSR &FFE7
  720 PLP
  730 BCS exit
  740 BIT &FF
  750 BPL noescape
  760 JMP escape
  770 .noescape
  780 CPY #0
  790 BNE outerloop
  800 INC &A9
```

Continued ▶

◀ Acorn Forum listing 2 continued

```
  810 STA &A9
  820 JMP outerloop
  830 .exit
  840 RTS
  850 .escape
  860 BRK
  870 EQUB &11
  880 EQUS "Escape"
  890 EQUB 0
  900 .printdec
  910 LDX #255
  920 .hunloop
  930 INX
  940 SEC
  950 SBC #100
  960 BCS hunloop
  970 PHA
  980 TXA
  990 JSR digit
 1000 PLA
 1010 CLC
 1020 ADC #100
 1030 LDX #255
 1040 .tenloop
 1050 INX
 1060 SEC
 1070 SBC #10
 1080 BCS tenloop
 1090 PHA
 1100 TXA
 1110 JSR digit
 1120 PLA
 1130 CLC
 1140 ADC #10
 1150 JSR digit
 1160 RTS
 1170 .digit
 1180 ORA #48
 1190 JSR &FFEE
 1200 RTS
 1210 .char
 1220 EQUB &20
 1230 .count
 1240 EQUB 0
 1250 .hi
 1260 EQUB 0
 1270 .lo
 1280 EQUB 0
 1290 ]
 1300 NEXT
```

Continued ▶

◀ Acorn Forum listing 2 continued

```
 1310 ?&226=code% MOD 256
 1320 ?&227=code% DIV 256
 1330 REM Maximum 32 characters
 1340 VDU 23,28,65,90,0;0;0;
```

Listing 4. Which processor?

```
   10 REM Which processor?
   20 REM by David Spencer
   30 REM for B/B+/M/C/E
   40 REM (c) Acorn User August 1987
   50 :
   60 DIM M% &100
   70 FOR pass=0 TO 3 STEP 3
   80 P%=M%
   90 [OPT pass
  100 LDA #0
  110 STA &70
  120 EQUB &3A \DEC A
  130 ASL A
  140 ROR &70
  150 EQUB &E7 \ SMB6,&70
  160 EQUB &70
  170 NOP
  180 NOP
  190 LDA &70
  200 AND #&C0
  210 BNE cmos
  220 BRK
  230 EQUB 255
  240 EQUS "6502"
  250 EQUB 0
  260 .cmos
  270 AND #&40
  280 BNE rockwell
  290 BRK
  300 EQUB 254
  310 EQUS "65(S)C12"
  320 EQUB 0
  330 .rockwell
  340 BRK
  350 EQUB 253
  360 EQUS "R65C02"
  370 EQUB 0
  380 ]
  390 NEXT
  400 CALL M%
```

See Hints & Tips, page 81

Listing 1. ***Twinkle, Twinkle Little Star***

```
   10 REM Hints & Tips -
 Listing 1
   20 REM By Martin Phil
lips
   30 REM For BBC B/B+/M
/E/C
   40 REM (c) Acorn User
 Aug 1987
   50 :
   60 CLS
   70 PRINTTAB(6,12)"Twi
nkle, Twinkle Little Sta
r"
   80 ENVELOPE 1,2,0,0,0
,0,0,0,127,-1,0,0,126,0
   90 ENVELOPE 2,2,0,0,0
,0,0,0,127,-1,0,0,126,0
  100 REPEAT
  110 READ P,D
  120 FOR N=1 TO 2
  130 SOUND N,1,P,D
  140 SOUND N,0,0,0
  150 NEXT N
  160 UNTIL P=0
  170 :
  180 REM *** line 1 ***
  190 DATA 52,8,52,8,80,
8,80,8
  200 DATA 88,8,88,8,80,
16
  210 DATA 72,8,72,8,68,
8,68,8
  220 :
  230 REM *** line 2 ***
  240 DATA 60,8,60,8,52,
16
  250 DATA 80,8,80,8,72,
8,72,8
  260 DATA 68,8,68,8,60,
16
  270 :
  280 REM *** line 3 ***
  290 DATA 80,8,80,8,72,
8,72,8
  300 DATA 68,8,68,8,60,
16
  310 DATA 52,8,52,8,80,
8,80,8
  320 :
  330 REM *** line 4 ***
  340 DATA 88,8,88,8,80,
16
```

Continued ▶

JOE'S JOTTINGS

◀ Hints & Tips listing 1 continued

```
350 DATA 72,8,72,8,68,8,68,8
360 DATA 60,8,60,8,52,16
370 :
380 REM *** END ***
390 DATA 0,0
```

Listing 2. Acorn *Database*

```
10 REM Hints & Tips - Listing 2
20 REM By Chris Dawson
30 REM For BBC B/B+/M
40 REM (c) Acorn User August 1987
50 :
60 CLOSE #0
70 *FX202,32
75 REM N%=start of store for incoming strings
80 N%=&2000
90 MODE 7
100 A$=CHR$(129)+CHR$(141)
110 PRINTTAB(6,2)A$"Information extractor"
120 PRINTTAB(6,3)A$"Information extractor"
130 PRINTTAB(15,4)A$"for"
140 PRINTTAB(15,5)A$"for"
150 PRINTTAB(9,6)A$"Acorn Database"
160 PRINTTAB(9,7)A$"Acorn Database"
170 PROCopenfile
180 FOR A%=1 TO H%
190 PTR#X%=817+(I%*(A%-1))
200 PROCputin
210 PROCcheckputout
220 NEXT A%
230 PROCsave
240 END
250 :
```

Continued ▶

◀ Hints & Tips listing 2 continued

```
260 DEF PROCopenfile
265 REM Put your file name here
270 X%=OPENIN("name")
280 PTR#X%=797
285 REM get number of records on file
290 INPUT#X%,H%
295 REM get size of each record
300 PTR#X%=812
310 INPUT#X%,I%
320 PTR#X%=817
330 ENDPROC
340 :
350 DEF PROCputin
360 INPUT#X%,NAME$,AA$,AB$,AC$,AD$
370 ENDPROC
380 :
390 DEF PROCcheckputout
400 PRINTTAB(2,10)CHR$(131)NAME$
410 PRINTTAB(2,11)CHR$(131)AA$
420 PRINTTAB(2,12)CHR$(131)AB$
430 PRINTTAB(2,13)CHR$(131)AC$
440 PRINTTAB(2,14)CHR$(131)AD$
450 PRINTTAB(1,20)CHR$(129)"Write to file (Y,N or Q)?"
460 QQ$=GET$
470 IF QQ$<>"Y" AND QQ$<>"N" AND QQ$<>"Q" THEN GOTO 440
480 IF QQ$="Y" THEN PROCmem
490 IF QQ$="Q" THEN PROCsave:END
500 ENDPROC
510 :
520 DEF PROCmem
530 $N%=NAME$:N%=N%+LEN(NAME$)+1
540 $N%=AA$:N%=N%+LEN(AA$)+1
```

Continued ▶

◀ Hints & Tips listing 2 continued

```
550 $N%=AB$:N%=N%+LEN(AB$)+1
560 $N%=AC$:N%=N%+LEN(AC$)+1
570 $N%=AD$:N%=N%+LEN(AD$)+1
580 ENDPROC
590 :
600 DEF PROCsave
610 file$="NEWFILE":start$=" 2000 "
620 OSCLI("SAVE "+file$+start$+STR$~(N%))
630 CLS
640 PRINTTAB(5,10)CHR$(131)CHR$(141)"File saved as 'NEWFILE'"
650 PRINTTAB(5,11)CHR$(131)CHR$(141)"File saved as 'NEWFILE'"
660 CLOSE #0
670 ENDPROC
```

Listing 3. *Wordwise Plus* routine

```
REM Hints & Tips - Listing 3
REM By Chris Dawson
REM For BBC B/B+/M with Wordwise Plus
REM (c) Acorn User August 1987
CLOSE#0
A%=OPENIN "NEWFILE"
SELECT TEXT
DELETE MARKERS
REPEAT
DEFAULTS
CURSOR TOP
A$=GLF$#A%
B$=GLF$#A%
C$=GLF$#A%
D$=GLF$#A%
E$=GLF$#A%
PRINT TEXT
UNTIL EOF#A%
PRINT">> FINISHED >>"
CLOSE#0
DISPLAY
```

See Joe's Jottings, page 88

Listing 1. Day of the week

```
10 REM Day of Week
20 REM by Joe Telford
30 REM for B/B+/M/C/E
40 REM (c) Acorn User August 1987
50 :
60 MODE 6
70 INPUT "Year eg 1834 ",yr
80 INPUT "Month eg Jan=1 Feb=2 etc ",month
90 INPUT "Date in month eg 23 12 etc ",dte
100 PROCsetup
110 PROCdodays
120 PRINT "That day is a ";MID$(days$,days*5+2,5)
130 END
140 :
```

Continued ▶

◀ Joe's Jottings listing 1 continued

```
150 DEF PROCerr(err)
160 *FX 12
170 *FX 4
180 REPORT:PRINT"at line";ERL
190 END
200 :
210 DEF PROCsetup
220 basedow%=1
230 baseyr=1700
240 basemonth=1
250 month$="Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec "
260 days$="  SUN  MON TUES  WED THUR FRI  SAT "
270 RESTORE
280 DIM date%(12,1),month$(12)
```

Continued ▶

◀ Joe's Jottings listing 1 continued

```
290 DATA 31,28,31,30,31,30,31,31,30,31
,30,31
300 DATA January,February,March,April,
May,June,July,August,September,October,N
ovember,December
310 FOR loop%=1 TO 12
320 READ date%(loop%,0)
330 date%(loop%,1)=date%(loop%-1,1)+da
te%(loop%,0)
340 NEXT
350 FOR loop%=1 TO 12
360 READ month$(loop%)
370 NEXT
380 ENDPROC
390 :
400 DEF PROCdodays
410 GCOL 0,0
420 days=(basedow%+FNelapse(dte))MOD7
430 ENDPROC
440 :
450 DEF FNelapse(dte)
460 ed=(yr-baseyr)*365
470 ed=ed+date%(month-1,1)
480 FOR loop%=baseyr TO yr
490 IF (loop% MOD 4)= 0 THEN ed=ed+1
500 NEXT
510 IF (month<3) AND (yr MOD 4=0) THEN
ed=ed-1
520 =ed+dte
```

Listing 2. Monthly calendar

```
10 REM Monthly calendar
20 REM by Joe Telford
30 REM for BBC B/B+/M/C/E
40 REM (c) Acorn User August 1987
50 :
60 MODE 0
70 Z%=@%:@%=&505
80 INPUT "Year eg 1834 ",yr
90 INPUT "Month eg Jan=1 Feb=2 etc ",
month
100 PRINT "hard copy? (Y/N) ";
110 REPEAT
120 h$=CHR$(GET AND 223)
130 UNTIL h$="Y" OR h$="N"
140 PRINT h$
150 PROCsetup
160 PROCdodays
170 CLS
180 IF h$="Y" THEN PROCprintdays(2) EL
SE PROCprintdays(3)
190 @%=Z%
200 END
210 :
220 DEF PROCerr(err)
230 *FX12
240 *FX4
250 REPORT:PRINT"at line";ERL
260 END
270 :
280 DEF PROCsetup
290 basedow%=1:baseyr=1700:basemonth=1
300 month$="Jan Feb Mar Apr May Jun Ju
l Aug Sep Oct Nov Dec "
310 days$="  SUN  MON TUES  WED THUR
FRI  SAT "
320 RESTORE
330 DIM date%(12,1),month$(12)
340 DATA 31,28,31,30,31,30,31,31,30,31
,30,31
```

Continued ▶

◀ Joe's Jottings listing 2 continued

```
350 DATA January,February,March,April,
May,June,July,August,September,October,N
ovember,December
360 FOR loop%=1 TO 12
370 READ date%(loop%,0)
380 date%(loop%,1)=date%(loop%-1,1)+da
te%(loop%,0)
390 NEXT
400 FOR loop%=1 TO 12
410 READ month$(loop%)
420 NEXT
430 ENDPROC
440 :
450 DEF PROCdodays
460 GCOL 0,0
470 days=(basedow%+FNelapse(1))MOD7
480 ENDPROC
490 :
500 DEF FNelapse(dte)
510 ed=(yr-baseyr)*365
520 ed=ed+date%(month-1,1)
530 FOR loop%=baseyr TO yr
540 IF (loop% MOD 4)= 0 THEN ed=ed+1
550 NEXT
560 IF (month<3) AND (yr MOD 4=0) THEN
ed=ed-1
570 =ed+dte
580 :
590 DEF PROCprintdays(p)
600 xday=days
610 last=date%(month,0):IF month=2 AND
(yr MOD 4)=0 THEN last=last+1
620 VDU p
630 PRINT month$(month);TAB(31);yr
640 PRINT STRING$(36,"-")
650 PRINT days$ ' STRING$(36,"-")
660 FOR day%=1 TO last
670 PRINT TAB(xday*5) day%;
680 xday=(xday+1) MOD 7
690 IF xday=0 THEN PRINT
700 NEXT
710 PRINT ' STRING$(36,"-")
720 VDU 3
730 ENDPROC
```

Listing 3. Annual calendar

```
10 REM Annual calendar
20 REM by Joe Telford
30 REM for BBC B/B+/M/C/E
40 REM (c) Acorn User August 1987
50 :
60 MODE 0
70 Z%=@%:@%=&505
80 INPUT "Year eg 1834 ",yr
90 PRINT "hard copy? (Y/N) ";
100 REPEAT
110 h$=CHR$(GET AND 223)
120 UNTIL h$="Y" OR h$="N"
130 PRINT h$
140 PROCsetup
150 FOR month= 1 TO 12
160 PRINT "Press space for next month:
"
170 REPEAT UNTIL GET=32
180 PROCdodays
190 CLS
200 IF h$="Y" PROCprintdays(2)ELSE PRO
Cprintdays(3)
210 NEXT
220 @%=Z%
230 END
240 :
```

Continued ▶

◀ Joe's Jottings listing 3 continued

```
250 DEF PROCerr(err)
260 *FX12
270 *FX4
280 REPORT:PRINT"at line";ERL
290 END
300 :
310 DEF PROCsetup
320 basedow%=1:baseyr=1700:basemonth=1
330 month$="Jan Feb Mar Apr May Jun Ju
l Aug Sep Oct Nov Dec "
340 days$="  SUN  MON TUES  WED THUR
FRI  SAT "
350 RESTORE:DIM date%(12,1),month$(12)
360 DATA 31,28,31,30,31,30,31,31,30,31
,30,31
370 DATA January,February,March,April,
May,June,July,August,September,October,N
ovember,December
380 FOR loop%=1 TO 12
390 READ date%(loop%,0)
400 date%(loop%,1)=date%(loop%-1,1)+da
te%(loop%,0)
410 NEXT
420 FOR loop%=1 TO 12
430 READ month$(loop%)
440 NEXT
450 ENDPROC
460 :
470 DEF PROCdodays
480 GCOL 0,0
490 days=(basedow%+FNelapse(1))MOD7
500 ENDPROC
510 :
520 DEF FNelapse(dte)
530 ed=(yr-baseyr)*365
540 ed=ed+date%(month-1,1)
550 FOR loop%=baseyr TO yr
560 IF (loop% MOD 4)= 0 THEN ed=ed+1
570 NEXT
580 IF (month<3) AND (yr MOD 4=0) THEN
 ed=ed-1
590 =ed+dte
600 :
610 DEF PROCprintdays(p)
620 xday=days
630 last=date%(month,0):IF month=2 AND
(yr MOD 4)=0 THEN last=last+1
640 VDU p
650 PRINT month$(month);TAB(31);yr
660 PRINT STRING$(36,"-")
670 PRINT days$'STRING$(36,"-")
680 FOR day%=1 TO last
690 PRINT TAB(xday*5) day%;
700 xday=(xday+1) MOD 7
710 IF xday=0 THEN PRINT
720 NEXT
730 PRINT ' STRING$(36,"-")
740 VDU 3
750 ENDPROC
```

Listing 4. Monthly planner

```
10 REM Monthly planner
20 REM by Joe Telford
30 REM for BBC B/B+/M/E
40 REM (c) Acorn User August 1987
50 :
60 MODE 0
70 Z%=@%:@%=&505
80 INPUT "Year eg 1834 ",yr
90 INPUT "Month eg Jan=1 Feb=2 etc ",
month
```

Continued ▶

◀ Joe's Jottings listing 4 continued

```
100 PRINT "hard copy? (Y/N) ";
110 REPEAT:h$=CHR$(GET AND 223):UNTIL
h$="Y" OR h$="N"
120 PRINT h$
130 PROCsetup
140 PROCdodays
150 CLS
160 IF h$="Y" THEN PROCprintdays(2) EL
SE PROCprintdays(3)
170 @%=Z%
180 END
190 :
200 DEF PROCerr(err)
210 *FX 12
220 *FX 4
230 REPORT:PRINT"at line";ERL
240 END
250 :
260 DEF PROCsetup
270 basedow%=1:baseyr=1700:basemonth=1
280 month$="Jan Feb Mar Apr May Jun Ju
l Aug Sep Oct Nov Dec "
290 days$="  SUN  MON TUES  WED THUR
FRI  SAT "
300 RESTORE
310 DIM date%(12,1),month$(12)
320 DATA 31,28,31,30,31,30,31,31,30,31
,30,31
330 DATA January,February,March,April,
May,June,July,August,September,October,N
ovember,December
340 FOR loop%=1 TO 12
350 READ date%(loop%,0)
360 date%(loop%,1)=date%(loop%-1,1)+da
te%(loop%,0)
370 NEXT
380 FOR loop%=1 TO 12
390 READ month$(loop%)
400 NEXT
410 ENDPROC
420 :
430 DEF PROCdodays
440 GCOL 0,0
450 days=(basedow%+FNelapse(1)) MOD 7
460 ENDPROC
470 :
480 DEF FNelapse(dte)
490 ed=(yr-baseyr)*365
500 ed=ed+date%(month-1,1)
510 FOR loop%=baseyr TO yr
520 IF (loop% MOD 4)= 0 THEN ed=ed+1
530 NEXT
540 IF (month<3) AND (yr MOD 4=0) THEN
 ed=ed-1
550 =ed+dte
560 :
570 DEF PROCprintdays(p)
580 CLS
590 VDU p
600 xday=days:yday=0
610 last=date%(month,0)
620 IF month=2 AND (yr MOD 4)=0 THEN l
ast=last+1
630 PRINT month$(month);TAB(75);yr'
640 PRINT STRING$(79,"-")
650 FOR day%=1 TO last
660 d$="th."
670 IF day%=1 OR day%=21 OR day%=31 TH
EN d$="st."
680 IF day%=2 OR day%=22 THEN d$="nd."
690 PRINT MID$(days$,xday*5+2,5);" ";d
ay%;d$
700 PRINT STRING$(79,"-")
```

Continued ▶

JOE'S JOTTINGS

◀ **Joe's Jottings listing 4 continued**

```
710 xday=(xday+1) MOD 7
720 IF xday=0 THEN yday=yday+1
730 NEXT
740 PRINT
750 VDU 3
760 ENDPROC
```

Listing 5. Desktop calendar

```
10 REM Desktop calendar
20 REM by Joe Telford
30 REM for BBC B/B+/M/C
40 REM compatible with JOE Front-end
50 REM (c) Acorn User August 1987
60 :
70 MODE 0
80 M%=0
90 ON ERROR PROCerr(0)
100 COLOUR 0:COLOUR 129
110 PROCsetup
120 PROCdodays
130 REPEAT
140 PROCptrloop
150 IF M%<>1 THEN VDU 5:MOVE px%,py%:G
COL 4,0:PRINT c$:VDU 4:ELSE *POINTER
160 IF px%>=512 AND px%<=540 AND py%>=
160 AND py%<=188 THEN PROCmonth(1):UNTIL
 0
170 IF px%>540 AND px%<=572 AND py%>18
8 AND py%<=222 THEN PROCmonth(-1):UNTIL
0
180 IF px%>=1060 AND px%<=1088 AND py%
>856 AND py%<=900 THEN PROCprintmonth:UN
TIL 0
190 IF px%>=508 AND px%<=544 AND py%>8
60 AND py%<=896 THEN PROCexit:COLOUR 128
:COLOUR 1:*BASIC
200 IF px%>=992 AND px%<=1008 AND py%>
=800 AND py%<=832 THEN PROCyear(1):UNTIL
 0
210 IF px%>=1072 AND px%<=1096 AND py%
>=800 AND py%<=832 THEN PROCyear(-1):UNT
IL 0
220 IF M%<>1 THEN VDU 5:MOVE px%,py%:G
COL 4,0:PRINT c$:VDU 4:ELSE *POINTER
230 IF M%=1 THEN *TMAX 1280 0
240 UNTIL FALSE
250 :
260 DEF PROCyear(y)
270 yr=yr+y
280 IF M%<>1 THEN VDU 5:GCOL 4,0:MOVE
px%,py%:PRINT c$:VDU 4:ELSE *POINTER 0
290 VDU 4
300 newdays=365 MOD 7
310 IF (yr MOD 4)=0 AND month>2 AND y>
0 THEN newdays=(366 MOD 7)
320 IF (yr MOD 4)=0 AND month<3 AND y<
0 THEN newdays=(366 MOD 7)
330 IF ((yr-y)MOD 4)=0 AND month<3 AND
y>0 THEN newdays=366 MOD 7
340 IF ((yr-y)MOD 4)=0 AND month>2 AND
y<0 THEN newdays=366 MOD 7
350 IF y>0 THEN days=(days+newdays) MO
D 7
360 IF y<0 THEN days=(7+days-newdays)
MOD 7
370 PROCturnsheet
380 PROCprintdays
390 VDU 5
400 ENDPROC
```

Continued ▶

◀ **Joe's Jottings listing 5 continued**

```
410 :
420 DEF PROCprintmonth
430 IF M%<>1 VDU 5:MOVE px%,py%:PRINT
c$:VDU 4:ELSE *POINTER 0
440 IF FNc(" CONFIRM "," CANCEL ","Pri
nt Month")=0 THEN PROCmonth(0):ENDPROC
450 VDU 2,1,14,1,14,3
460 FOR dummy=1 TO 300:NEXT
470 IF ADVAL(-4)<63 THEN PROCerr(1):EN
DPROC
480 PROCh
490 *FX 3,10
500 xday=days:yday=0
510 VDU 14:PRINT month$(month);STRING$
(32-LEN month$(month)," ");yr
520 VDU 14:PRINT STRING$(36,"-")
530 VDU 14:PRINT days$:VDU 14:PRINT ST
RING$(36,"-")':VDU 14
540 FOR day%=1 TO last
550 PRINT TAB(xday*5)day%;
560 xday=xday+1:IF xday>6 THEN xday=0:
yday=yday+1:PRINT':VDU 14
570 NEXT
580 PRINT CHR$ (14) ' STRING$(36,"-")

590 *FX 3,0
600 PROCmonth(0)
610 ENDPROC
620 :
630 DEF PROCmonth(m)
640 IF M%<>1 THEN VDU 5:GCOL 4,0:MOVE
px%,py%:PRINT c$:VDU 4:ELSE *POINTER 0
650 VDU 4
660 IF m>0 THEN newdays=date%(month,0)
 MOD 7
670 month=month+m
680 IF month=13 THEN yr=yr+1:month=1
690 IF month=0 THEN yr=yr-1:month=12
700 IF month=3 AND m>0 AND (yr MOD 4)=
0 THEN newdays=(newdays+1) MOD 7
710 IF m<0 THEN newdays=date%(month,0)
 MOD 7
720 IF month=2 AND m<0 AND (yr MOD 4)=
0 THEN newdays=(newdays+1) MOD 7
730 IF m>0 days=(days+newdays) MOD 7
740 IF m<0 days=(7+days-newdays) MOD 7
750 mon$=MID$(month$,(month-1)*4+1,3)
760 PROCturnsheet
770 PROCprintdays
780 VDU 5
790 ENDPROC
800 :
810 DEF PROCerr(err)
820 IF err=1 THEN PROCok("Reset your p
rinter and try again."):PROCmonth(0):END
PROC
830 *FX 12
840 *FX 4
850 VDU 4
860 REPORT:PRINT"at line";ERL
870 END
880 :
890 DEF PROCptrloop
900 VDU 5:GCOL 4,0
910 IF M%<>1 THEN MOVE px%,py%:PRINT c
$ ELSE *POINTER
920 REPEAT:PROCmoveptr:UNTIL INKEY(0)=
13
930 IF M%=1 THEN px%=ADVAL 7:py%=ADVAL
 8 :*POINTER 2
940 PROCclick
```

Continued ▶

◀ Joe's Jottings listing 5 continued

```
 950 IF M%=0 THEN MOVE px%,py%:PRINT c$
 960 VDU 4:REPEAT UNTIL INKEY$(10)=""
 970 ENDPROC
 980 :
 990 DEF PROCmoveptr
 1000 GCOL 4,0
 1010 IF ck%=1 PROCclock
 1020 IF INKEY-56 THEN *SDUMP+
 1030 IF M%=1 ENDPROC
 1040 MOVE px%,py%
 1050 gap%=8
 1060 IF INKEY-1 THEN gap%=32
 1070 IF INKEY-58 AND (py%+gap%)<=1023 T
HEN PRINT c$:py%=py%+gap%:MOVE px%,py%:P
RINT c$:MOVE px%,py%
 1080 IF INKEY-42 AND (py%-gap%)>=32 THE
N PRINT c$:py%=py%-gap%:MOVE px%,py%:PRI
NT c$:MOVE px%,py%
 1090 IF INKEY-122 AND (px%+gap%)<=1248
THEN PRINT c$:px%=px%+gap%:MOVE px%,py%:
PRINT c$:MOVE px%,py%
 1100 IF INKEY-26 AND (px%-gap%)>0 THEN
PRINT c$:px%=px%-gap%:MOVE px%,py%:PRINT
 c$:MOVE px%,py%
 1110 ENDPROC
 1120 :
 1130 DEF PROCclick:SOUND 0,-15*vol,2,1:
ENDPROC
 1140 :
 1150 DEF PROCok(m$)
 1160 LOCAL x,y,len,h,b2
 1170 x=514:y=400:len=564:h=200
 1180 PROCmww(x,y,len,h)
 1190 PROCbut(" O.K. ",x+400,y+16)
 1200 VDU 5
 1210 MOVE x+(len-(LEN(m$)*16))/2,y+154
 1220 PRINT m$
 1230 MOVE x+52,y+64
 1240 PRINT "Press this button:"
 1250 PROCptrloop
 1260 ENDPROC
 1270 :
 1280 DEF PROCr(x,y,l,w,f)
 1290 MOVE x,y
 1300 IF f=0 THEN DRAW x+l,y:DRAW x+l,y+
w:DRAW x,y+w:DRAW x,y:ENDPROC
 1310 MOVE x+l,y:PLOT 85,x,y+w-4:MOVE x,
y+w
 1320 MOVE x+l,y+4:PLOT 85,x+l,y+w:MOVE
x,y
 1330 ENDPROC
 1340 :
 1350 DEF PROCexit
 1360 REPEAT UNTIL INKEY$(30)=""
 1370 *FX 12,0
 1380 *FX 4,0
 1390 VDU 4,26
 1400 ENDPROC
 1410 :
 1420 DEF PROCopenww(x,y,len,ht)
 1430 GCOL 0,1
 1440 VDU 26,28,x,y+ht,x+len-1,y
 1450 GCOL 0,1:PROCr(x*16-4,1016-(y+ht+1
)*32,len*16+6,(ht+1)*32+12,1)
 1460 GCOL 0,0
 1470 PROCr(x*16-4,1016-(y+ht+1)*32,len*
16+6,(ht+1)*32+12,0)
 1480 PROCr(x*16,1012-(y+ht+1)*32,len*16
+8,4,1)
 1490 PROCr((x+len)*16,1012-(y+ht+1)*32,
8,(ht+1)*32+4,1)
 1500 ENDPROC
 1510 :
```

Continued ▶

◀ Joe's Jottings listing 5 continued

```
 1520 DEF PROCh
 1530 GCOL 0,1
 1540 PROCr(px%-4,py%-32,36,68,1)
 1550 VDU 5:GCOL 4,0
 1560 MOVE px%,py%+32
 1570 PRINT H$:VDU 4
 1580 ENDPROC
 1590 :
 1600 DEF PROCsetup
 1610 VDU 23,128,0,0,0,0,192,48,12,3
 1620 VDU 23,129,255,252,252,195,0,0,0,0
 1630 VDU 23,130,129,195,231,255,255,231
,195,129
 1640 VDU 23,131,24,24,60,60,126,126,255
,255
 1650 VDU 23,132,255,255,126,126,60,60,2
4,24
 1660 VDU 23,158,255,192,192,192,224,224
,248,252
 1670 VDU 23,159,255,3,3,3,7,7,31,63
 1680 VDU 23,160,252,248,224,224,192,192
,192,255
 1690 VDU 23,161,63,31,7,7,3,3,3,255
 1700 VDU 4
 1710 IF M%=1 THEN *MOUSE
 1720 *KEY 0 |?
 1730 down$=CHR$132
 1740 cl$=CHR$130
 1750 up$=CHR$131
 1760 H$=CHR$158+CHR$159+CHR$10+CHR$8+CH
R$8+CHR$160+CHR$161
 1770 *FX 4,1
 1780 *FX 12,3
 1790 *FX 11,5
 1800 pointer$=CHR$129+CHR$128:c$=pointe
r$
 1810 px%=600:py%=400
 1820 ck%=0:vol=1
 1830 cx%=512:cy%=900
 1840 basedow%=1:baseyr=1700:basemonth=1
 1850 month$="Jan Feb Mar Apr May Jun Ju
l Aug Sep Oct Nov Dec "
 1860 days$="  SUN  MON TUES  WED THUR
FRI  SAT "
 1870 RESTORE
 1880 DIM date%(12,1),month$(12)
 1890 DATA 31,28,31,30,31,30,31,31,30,31
,30,31
 1900 DATA January,February,March,April,
May,June,July,August,September,October,N
ovember,December
 1910 FOR loop%=1 TO 12
 1920 READ date%(loop%,0)
 1930 date%(loop%,1)=date%(loop%-1,1)+da
te%(loop%,0)
 1940 NEXT
 1950 FOR loop%=1 TO 12
 1960 READ month$(loop%)
 1970 NEXT
 1980 PROCfrommaster
 1990 PROCdrawcalendar(cx%,cy%)
 2000 ENDPROC
 2010 :
 2020 DEF PROCdrawcalendar(cx%,cy%)
 2030 LOCAL loop%
 2040 PROCopenww(cx%/16,(1024-cy%)/32,36
,23)
 2050 GCOL 0,0
 2060 FOR loop%=1 TO 3
 2070 MOVE cx%,cy%-(loop%*12):DRAW cx%+(
36*16),cy%-(loop%*12)
 2080 NEXT
```

Continued ▶

◀ Joe's Jottings listing 5 continued

```
2090 FOR loop%=1 TO 5
2100 MOVE cx%-4,cy%-(loop%*8)-23*32:DRA
W cx%+(36*16),cy%-(loop%*8)-23*32
2110 NEXT
2120 VDU 10,130,32
2130 PRINT TAB(13,1) " Calendar ";TAB(3
4,1)" P"
2140 MOVE cx%-4,cy%-48:DRAW cx%+(36*16)
,cy%-48
2150 z%=@%:@%=&404
2160 ENDPROC
2170 :
2180 DEF PROCturnsheet
2190 CLS
2200 ENDPROC
2210 :
2220 DEF PROCdodays
2230 GCOL 0,0
2240 days=(basedow%+FNelapse(1)) MOD 7
2250 VDU 26,28,cx%/16,((1024-cy%)/32)+2
3,(cx%/16)+35,((1024-cy%)/32)+3,12
2260 PROCprintdays
2270 ENDPROC
2280 :
2290 DEF PROCprintdays
2300 xday=days:yday=0
2310 GCOL 0,0
2320 last=date%(month,0)
2330 IF month=2 AND (yr MOD 4)=0 THEN l
ast=last+1
2340 PROCr(cx%-4,cy%-8-23*32,64,64,0)
2350 MOVE cx%-4,cy%+56-23*32:DRAWcx%+60
,cy%-8-23*32
2360 PRINT TAB(0,0) month$(month);TAB(3
0,0) CHR$(131);yr;CHR$(132)
2370 PRINT days$;STRING$(36,"-")
2380 FOR day%=1 TO last
2390 PRINT TAB(xday*5,yday*2+4)day%;
2400 xday=(xday+1) MOD 7
2410 IF xday=0 THEN yday=yday+1
2420 NEXT
2430 GCOL 4,0
2440 ENDPROC
2450 :
2460 DEF FNelapse(dte)
2470 ed=(yr-baseyr)*365
2480 month=(INSTR(month$,mon$)DIV 4)+1
2490 ed=ed+date%(month-1,1)
2500 FOR loop%=baseyr TO yr
2510 IF (loop% MOD 4)= 0 THEN ed=ed+1
2520 NEXT
2530 IF (month<3) AND (yr MOD 4=0) THEN
ed=ed-1
2540 =ed+dte
2550 :
2560 DEF PROCfrommaster
2570 yr=VAL(MID$(TIME$,12,4))
2580 mon$=MID$(TIME$,8,3)
2590 dte=VAL(MID$(TIME$,5,2))
2600 ENDPROC
2610 :
2620 DEF PROCmww(x,y,len,h)
2630 GCOL 0,1:PROCr(x,y,len,h,1)
2640 GCOL 0,0:PROCr(x,y,len,h,0)
2650 PROCr(x+8,y-4,len,4,1)
2660 PROCr(x+len,y-4,8,h,1)
2670 ENDPROC
2680 :
2690 DEF FNbut(x,y,L,H)
2700 =((px%>=x AND px%<=(x+L)) AND (py%
>=y AND py%<=(y+H)))
2710 :
2720 DEF PROCbut(m$,bx%,by%)
```

Continued ▶

◀ Joe's Jottings listing 5 continued

```
2730 GCOL 4,0:VDU 5
2740 PROCr(bx%,by%,LEN(m$)*16+16,64,0)
2750 GCOL 0,0:MOVE bx%+8,by%+48:PRINT m
$
2760 VDU 4
2770 ENDPROC
2780 :
2790 DEF FNc(a$,b$,m$)
2800 LOCAL x,y,len,h,b1,b2
2810 x=564:y=500:len=480:h=200
2820 PROCmww(x,y,len,h)
2830 PROCbut(a$,x+32,y+16)
2840 PROCbut(b$,x+304,y+16)
2850 VDU 5:MOVE x+(len-(LEN(m$)*16))/2,
y+154
2860 PRINT m$:MOVE x+234,y+64:PRINT "or
"
2870 REPEAT
2880 PROCptrloop
2890 b1=FNbut(x+32,y+16,10*16,64)
2900 b2=FNbut(x+304,y+16,9*16,64)
2910 UNTIL b1=-1 OR b2=-1
2920 IF b1=-1 THEN =-1 ELSE =0
```

See One Liners, page 93

Listing 1. By Duncan Rowland

```
10 REM by Duncan Rowland
20 REM (c) Acorn User August 1987
30 :
40 MODE 2
50 c=1
60 m=0
70 FOR x=1 TO 1800 STEP 20
80 FOR n=0 TO 2*PI STEP PI/(x/3)
90 PLOT 69,640+x/3*2*SIN(n),550-(SIN(
4+(x/50))*50)+x/3*COS(n)
100 NEXT n:c=c+1:GCOL 0,c
110 IF c=13 THEN c=0:NEXT x ELSE NEXT
x
120 REPEAT
130 FOR n=1 TO 13
140 VDU 19,n,4,0,0,0,19,m,6,0,0,0
150 FOR t=1 TO 100
160 m=n
170 NEXT t,n
180 UNTIL FALSE
```

Listing 2. By Robert Miller

```
10 REM by Robert Miller
20 REM (c) Acorn User August 1987
30 :
40 MODE 2
50 VDU 23;8202;0;0;0;
60 c=1
70 FOR x=0 TO 1279 STEP 8
80 GCOL 0,c
90 PLOT 69,x,0
100 PLOT 69,1279-x,1023
110 PLOT 69,1279,x
120 PLOT 69,0,1023-x
130 c=c+1
140 IF c=16 c=1
150 NEXT x
160 :
170 c=1
180 REPEAT
190 VDU19,c,7;0;
```

Continued ▶

◀ One Liners listing 2 continued

```
200 i=INKEY(5)
210 VDU19,c,0;0;
220 c=c+1
230 IF c=16 c=1
240 UNTIL 0
```

Listing 3. By Robert Miller (2)

```
 10 REM by Robert Miller
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 4
 50 VDU 23;8202;0|
 60 p%=359
 70 DIM s%(p%)
 80 FOR I%=0 TO p%
 90 s%(I%)=SINRADI%*100
100 NEXT I%
110 REPEAT
120 FOR Y%=0 TO p% STEP 4
130 FOR I%=100 TO 900 STEP 100
140 PLOT 69,0,s%(Y%)+I%
150 NEXT
160 VDU23,7|
170 NEXT
180 UNTIL 0
```

Listing 4. By Graham Bell

```
 10 REM by G Bell
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 1
 50 INPUT "beta1="b1%
 60 INPUT "beta2="b2%
 70 INPUT "gamma="G%
 80 INPUT "alpha="A%
 90 INPUT "modulus="M%
100 TIME=0
110 FOR I%=0 TO 399 STEP 4
120 FOR J%=0 TO 399 STEP 4
130 x=b1%+G%*I%
140 y=b2%+G%*J%
150 PLOT &45*-(INT(A%*(SINx+SINy))MODM
%=0),I%,J%
160 NEXT
170 NEXT
180 PRINT "time=";TIME/100
```

Listing 5. By J Greening

```
 10 REM by J Greening
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 2
 50 VDU 29,800;512;
 60 FOR x=-2 TO .5 STEP .02
 70 FOR y=1.3 TO 0 STEP -.02
 80 r=0
 90 i=0
100 c=0
110 REPEAT
120 a=r*r
130 b=i*i
140 n=a-b+x
```

Continued ▶

◀ One Liners listing 5 continued

```
150 m=2*r*i+y
160 c=c+1
170 s=a+b
180 r=n
190 i=m
200 UNTIL s>4 OR c>99
210 GCOL 0,6+(c>99)+(c>25)+(c>12)+(c>8
)+(c>5)+(c>3)
220 X=400*x
230 Y=400*y
240 FOR Z=Y-4 TO Y STEP 4
250 PLOT 69,X,Z
260 PLOT 69,X,-Z
270 NEXT:NEXT:NEXT
```

Listing 6. By J Young

```
 10 REM by J Young
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 0
 50 MOVE 656,17
 60 FOR x=2.8 TO 31 STEP .2
 70 a=ATN(-COSx)
 80 r=1600/x^1.1
 90 VDU 29,48*SINx+640;24*x-50;
100 DRAW 0,0
110 PLOT 1,SINa*r,COSa*r
120 MOVE 0,0
130 NEXT x
140 FOR A=0 TO 6 STEP .45
150 b=SINA
160 c=COSA
170 FOR t=0.2 TO 5.6 STEP 0.2
180 p=40*SIN(t^1.13)
190 q=140*(1-COSt)
200 DRAW p*-c+q*b,p*b+q*c
210 NEXT t
220 NEXT A
230 END
```

Listing 7. By R Weir

```
 10 REM by R Weir
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 1
 50 VDU 29,640;512;
 60 FOR C%=1 TO 3
 70 GCOL 3,(C%+1) MOD 3+1
 80 M%=512-C%*4
 90 FOR X%=-M% TO M% STEP 4
100 MOVE X%,-M%
110 DRAW -X%,M%
120 MOVE -M%,X%
130 DRAW M%,-X%
140 NEXT:NEXT
```

Listing 8. By Marc Young

```
 10 REM by Marc Young
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 1
 50 s=PI/32
 60 FOR c=1 TO 3
 70 VDU 19,c,c*2;0;
```

Continued ▶

◀ **One Liners listing 8 continued**

```
 80 NEXT
 90 FOR A=PI TO 0 STEP-PI/6
100 FOR b=-A TO A STEP 2*A
110 c=PI-b
120 x=620+500*SINc
130 y=512+300*COSc
140 r=220+80*COSA
150 VDU 29,x;y;
160 GCOL 0,1+A*6
170 GCOL 0,A*6+128
180 FOR c=0 TO 1
190 FOR d=0 TO 1 STEP 0.2
200 p=1+d*(c=0)
210 o=1+d*(c=1)
220 FOR a=0 TO 2*PI STEP s
230 MOVE 0,0
240 MOVE o*r*SINa,p*r*COSa
250 PLOT 5-(c=d)*82,o*r*SIN(a+s),p*r*C
OS(a+s)
260 NEXT:NEXT:NEXT:NEXT:NEXT
```

Listing 9. By Iain Coulthard

```
 10 REM by Iain Coulthard
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 2
 50 VDU 29,640;512;
 60 MOVE 0,0
 70 FOR e=0 TO 19
 80 FOR x=0 TO 360
 90 GCOL 0,8+(e AND7)EOR-7*(x>180)
100 MOVE 0,0
110 PLOT 85,SIN(RAD(x))*480*COS(RAD(e*
4.5)),COS(RAD(x))*480
120 NEXT:NEXT
130 FOR s=0 TO 3
140 FOR m=0 TO &9FF
150 m?(&3000+&1400*s)=m?(&3000+&1400*s
)EOR&30
160 NEXT:NEXT
170 REPEAT
180 VDU 19,0,3;0;
190 FOR x=0 TO 7
200 FOR c=0 TO 7
210 VDU 19,c+8,7+6*((c+x AND 7)>3);0;
220 NEXT:NEXT
230 UNTIL 0
```

Listing 10. By Tim Brown

```
 10 REM by Tim Brown
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 2
 50 VDU 29,640;0;5
 60 FOR k=-10 TO 0 STEP.25
 70 j=((-k*4)MOD15)+1
 80 y=1
 90 q=1023+y*15
100 p=k*15
110 x=k
120 REPEAT
130 GCOL 0,(j MOD15)+1
140 PLOT 69,p,q
150 PLOT 69,-p,q
160 p=p+x
170 x=x*1.1
```

Continued ▶

◀ **One Liners listing 10 continued**

```
180 q=(q+y)/1.1
190 y=y*1.1
200 j=j+1
210 UNTIL POINT(p,q)=-1
220 NEXT
230 REPEAT
240 FOR c=1 TO 15
250 VDU 19,c,3;0;
260 a=INKEY(5)
270 VDU 19,c,0;0;
280 NEXT
290 UNTIL 0
```

Listing 11. By Cledwyn Jones

```
 10 REM by Cledwyn Jones
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 4
 50 VDU 23;8202;0;0;0;
 60 q=0
 70 MOVE 640,512
 80 FOR x=0 TO 16*PI STEP PI/50
 90 DRAW 640+((110+q)*(COS(x+41)))*SIN
(x*3),512+((80+q)*(SIN(x+34)))*(SIN(x*4)
)
100 q=q+0.5
110 NEXT
120 REPEAT UNTIL 0
```

Listing 12. By M Thorpe

```
 10 REM by M Thorpe
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 2
 50 *FX 9,0
 60 *FX 10,0
 70 VDU 5
 80 FOR z=.4 TO 2 STEP .4
 90 FOR X%=0 TO 1280 STEP 8
100 k=14*COSRAD(X%/z)
110 FOR Y%=0 TO 1020 STEP 4
120 c=k*COSRAD(Y%/z)
130 IF c>1 GCOL0,c:PLOT 69,X%,Y%:NEXT:
NEXT:NEXT:ELSE NEXT:NEXT:NEXT
140 REPEAT
150 m=RND(20)
160 FOR p=1 TO m
170 FOR n=1 TO m
180 VDU 19,n,(n+p)MODm;0;0;
190 NEXT
200 NEXT
210 UNTIL FALSE
```

Listing 13. By Jason Sorsby

```
 10 REM by Jason Sorsby
 20 REM (c) Acorn User August 1987
 30 :
 40 MODE 1
 50 FOR s=1 TO 100
 60 PLOT 69,RND(1279),RND(1023)
 70 NEXT
 80 FOR p=1 TO 6
 90 c=RND(3)
```

Continued ▶

INTERRUPTING BASIC

◀ **One Liners listing 13 continued**

```
100 VDU 29,RND(1279);RND(1023);
110 s=RND(30)+10
120 FOR a=-s TO s
130 x=SQR(s*s-a*a)
140 z=x*2
150 FOR b=-x TO x
160 j=b*4
170 k=a*4
180 IF RND(z)-x>b THEN GCOL 0,c:PLOT 6
9,j,k:NEXT:NEXT:NEXT:ELSE GCOL 0,0:PLOT
69,j,k:NEXT:NEXT:NEXT
```

Listing 14. By G Sanderson

```
 10 REM by G Sanderson
 20 REM (c) Acorn User August 1987
 30 :
 40 REPEAT
 50 MODE 2
 60 FOR Y%=100 TO 1000 STEP 400
 70 FOR X%=30 TO 1230 STEP 150
```

Continued ▶

◀ **One Liners listing 14 continued**

```
 80 VDU 29,X%;Y%;
 90 MOVE 0,0
100 FOR A%=0 TO 360 STEP 60
110 GCOL 3,4
120 MOVE 0,0
130 PLOT 85,COSRADA%*200,SINRADA%*250
140 NEXT
150 NEXT
160 NEXT
170 VDU 29,625;500;
180 b=700
190 t=0
200 REPEAT
210 b=b-60
220 t=t+42
230 GCOL 3,RND(7)
240 MOVE 0,0
250 FOR C%=0 TO 360 STEP 90
260 MOVE 0,0
270 PLOT 85,COS(RAD(C%))*b,SIN(RAD(C%)
)*t
280 NEXT
290 UNTIL b<10
300 g=GET
310 UNTIL 0
```

See Interrupting Basic, page 97

Listing 1. Interrupting Basic source code

```
  10 REM Interrupting B
asic source code
  20 REM By Mark de Weg
er
  30 REM For BBC B/B+/M
/E
  40 REM (c) Acorn User
 August 1987
  50 :
  60 MODE 6
  70 PROCsetup
  80 PROCassemble
  90 PROCchecksum
 100 PROCsave
 110 END
 120 :
 130 DEF PROCsetup
 140 code%=&900
 150 workspace%=&C00
 160 sum%=0
 170 eventnr=5
 180 basic=?&8015-48
 190 IF basic>4 OR basi
c=3:PRINT '"Sorry, only
BASICs 1,2 and 4."':END
 200 tel=EVAL("FNbasic"
+STR$(basic))
 210 *KEY10 OLD|MRUN|M
 220 brkv=!&202 AND &FF
FF
 230 IF brkv<&8000:PRIN
T''"Please press <BREAK>
":END
 240 *KEY10
 250 oswrch=!&20E AND &
FFFF
 260 oscli=&FFF7
 270 osbyte=&FFF4
 280 osword=&FFF1
 290 clock=&7B
 300 DIM buffer 255
 310 PRINT '"Interrupti
ng BASIC"
 320 PRINT '"by Mark de
Weger"
 330 PRINT ''"Assemblin
g code. Please wait..."
 340 ENDPROC
 350 :
 360 DEF FNbasic1
 370 schlin=&9942
 380 cont=&8B0C
 390 st1=&F7
 400 st2=&E4
 410 st3=&98
 420 checksum=&DFB9
 430 =5389
 440 :
 450 DEF FNbasic2
 460 schlin=&9970
 470 cont=&8B9B
 480 st1=&D8
 490 st2=&13
 500 st3=&99
 510 checksum=&E41A
 520 =5026
 530 :
 540 DEF FNbasic4
 550 schlin=&80CD
 560 cont=&9005
 570 st1=&DA
 580 st2=&59
 590 st3=&9C
 600 checksum=&DFE8
 610 =5210
 620 :
 630 DEF PROCassemble
 640 FOR pass=0 TO 2 ST
EP 2
 650 P%=code%
 660 [ OPT pass
 670 .event
 680 PHP
 690 PHA
 700 TXA
 710 PHA
 720 TYA
 730 PHA
 740 LDA #&FF
 750 STA &20
 760 PLA
 770 TAY
 780 PLA
 790 TAX
 800 PLA
 810 PLP
 820 .end
 830 RTS
 840 :
 850 .trace
 860 PHA
 870 LDA &8A
 880 BEQ comp
 890 PLA
 900 CMP #32
 910 BNE noend
 920 LDA #0
 930 STA &8A
 940 .noend
 950 LDA #0
 960 JMP oswrch
 970 .comp
 980 PLA
 990 CMP #91
1000 BEQ ok
1010 JMP out3
1020 .ok
1030 STX &79
1040 STY &7A
1050 STA &8B
1060 PLA
1070 TAX
1080 PLA
1090 TAY
1100 PHA
1110 TXA
1120 PHA
```

Continued ▶

INTERRUPTING BASIC

◀ Interrupting Basic listing 1 continued

```
1130 CPX #st2
1140 BEQ ok2
1150 JMP out2
1160 .ok2
1170 CPY #st3
1180 BEQ ok3
1190 JMP out2
1200 .ok3
1210 LDX &79
1220 LDY &7A
1230 LDA &8B
1240 PHP
1250 PHA
1260 TXA
1270 PHA
1280 TYA
1290 PHA
1300 LDA &2A
1310 STA &70
1320 LDA &2B
1330 STA &71
1340 LDA #0
1350 STA &20
1360 LDA &B
1370 STA &88
1380 LDA &C
1390 STA &89
1400 JSR checkfor
1410 BCC nofor
1420 LDA #4
1430 LDX #clock2 MOD 25
6
1440 LDY #clock2 DIV 25
6
1450 JSR &FFF1
1460 LDA #1
1470 STA &8A
1480 PLA
1490 TAY
1500 PLA
1510 TAX
1520 PLA
1530 PLP
1540 LDA #0
1550 JMP oswrch
1560 .nofor
1570 PLA
1580 TAY
1590 PLA
1600 TAX
1610 PLA
1620 PLP
1630 PLA
1640 PLA
1650 STA &79
1660 PLA
1670 STA &7A
1680 CMP #st1
1690 BNE nogoto
1700 LDA &7A
1710 PHA
1720 LDA &79
1730 PHA
1740 JMP goto
1750 .nogoto
1760 PLA
1770 .goto
1780 LDA &318
1790 STA &80
1800 LDA &319
1810 STA &81
1820 LDX #3
1830 .loop0
1840 LDA &310,X
1850 STA &82,X
1860 DEX
1870 BPL loop0
1880 LDA &D0
1890 STA &86
1900 LDA &D1
1910 STA &87
1920 TSX
1930 STX &76
1940 LDX #&FF
1950 .loop1
1960 LDA &100,X
1970 STA workspace%,X
1980 DEX
1990 BNE loop1
2000 LDX #&FF
2010 TXS
2020 INC &78
2030 LDA &72
2040 CLC
2050 ADC #10
2060 STA &72
2070 BCC nohigh
2080 INC &73
2090 .nohigh
2100 LDA &78
2110 CMP &77
2120 BNE over
2130 LDA #0
2140 STA &78
2150 LDA &74
2160 STA &72
2170 LDA &75
2180 STA &73
2190 .over
2200 LDA &72
2210 STA &2A
2220 LDA &73
2230 STA &2B
2240 .go
2250 LDA #0
2260 STA &2C
2270 STA &2D
2280 JSR schlin
2290 OPT FNright
2300 JMP badline
2310 .right
2320 SEC
2330 LDA &3D
2340 SBC #3
2350 STA &0B
2360 LDA &3E
2370 SBC #0
2380 STA &0C
2390 LDA #1
2400 STA &A
2410 JMP cont
2420 :
2430 .out2
2440 LDX &79
2450 LDY &7A
2460 LDA &8B
2470 .out3
2480 JMP oswrch
2490 :
2500 .eventson
2510 LDA #trace MOD 256
2520 STA &20E
2530 LDA #trace DIV 256
2540 STA &20F
2550 LDA #event MOD 256
2560 STA &220
2570 LDA #event DIV 256
2580 STA &221
2590 LDA #error MOD 256
2600 STA &202
2610 LDA #error DIV 256
2620 STA &203
2630 LDA #0
2640 STA &8A
2650 JSR settime
2660 JSR eventsoff2
2670 LDA #14
2680 LDX #eventnr
2690 JMP osbyte
2700 .settime
2710 LDA #4
2720 LDX #clock MOD 256
2730 LDY #clock DIV 256
2740 JMP osword
2750 :
2760 .eventsoff
2770 LDA #oswrch MOD 25
6
2780 STA &20E
2790 LDA #oswrch DIV 25
6
2800 STA &20F
2810 .eventsoff2
2820 LDA #13
2830 LDX #eventnr
2840 JSR osbyte
2850 LDA #0
2860 STA &20
2870 RTS
2880 :
2890 .return
2900 LDX #&FF
2910 .loop2
2920 LDA workspace%,X
2930 STA &100,X
2940 DEX
2950 BNE loop2
2960 LDX &76
2970 TXS
2980 PLA
2990 PLA
3000 PLA
3010 LDA &86
3020 STA &D0
3030 LDA &87
3040 STA &D1
3050 LDA #31
3060 JSR oswrch
3070 LDA &80
3080 JSR oswrch
3090 LDA &81
3100 JSR oswrch
3110 LDA #25
3120 JSR oswrch
3130 LDA #4
3140 JSR oswrch
3150 LDX #0
3160 .loop4
3170 LDA &82,X
3180 JSR oswrch
3190 INX
3200 CPX #4
3210 BNE loop4
3220 LDA &70
3230 STA &2A
3240 LDA &71
3250 STA &2B
3260 JSR settime
```

Continued ▶

INTERRUPTING BASIC

◀ **Interrupting Basic listing 1 continued**

```
3270 JMP go
3280 :
3290 .error
3300 PHA
3310 JSR eventsoff
3320 PLA
3330 JMP brkv
3340 :
3350 .checkfor
3360 LDA &88
3370 BNE nodec1
3380 DEC &89
3390 .nodec1
3400 DEC &88
3410 LDY #0
3420 .loop5
3430 LDA (&88),Y
3440 CMP #&D
3450 BEQ endofstm
3460 CMP #&3A
3470 BEQ endofstm
3480 CMP #&E3
3490 BEQ ffound
3500 LDA &88
3510 BNE nodec2
3520 DEC &89
3530 .nodec2
3540 DEC &88
3550 JMP loop5
3560 .ffound
3570 SEC
3580 RTS
3590 .endofstm
3600 CLC
3610 RTS
3620 :
3630 .clock2
3640 ]
3650 !P%=-1:P%=P%+4
3660 ?P%=&FF:P%=P%+1
3670 [ OPT pass
3680 :
3690 .badline
3700 BRK
3710 ]
3720 ?P%=50:P%=P%+1
3730 $P%="Bad task line
"
3740 P%=P%+LEN$P%
3750 ?P%=0:P%=P%+1
3760 NEXT
3770 ENDPROC
3780 :
3790 DEF PROCchecksum
3800 FOR loop%=code% TO
P%
3810 sum%=sum%+?loop%
3820 NEXT
3830 sum%=sum% AND ((te
l EOR sum%)<>0)
3840 IF sum%=checksum:E
NDPROC
3850 PRINT '"Checksum n
ot correct - check listi
ng"
3860 END
3870 :
3880 DEF FNright
3890 IF basic=4:[ OPT p
ass:BCS right:] ELSE [ O
PT pass:BCC right:]
3900 =pass
3910 :
3920 DEF PROCsave
3930 PRINT ''"Warning:
Once created, the object
code"'"is not transfera
ble between different"'"
BASICs."
3940 PRINT '"This objec
t code is suitable for"'
"BASIC ";basic;"."
3950 PRINT '"Press <SPA
CE> to save it."
3960 *FX 15,1
3970 REPEAT:UNTIL GET=3
2
3980 X%=buffer MOD 256
3990 Y%=buffer DIV 256
4000 $buffer="SAVE EVEN
TS "+STR$~(code%)+" "+ST
R$~(P%)+" "+STR$~(end)
4010 CALL oscli
4020 PRINT '"The object
code has been saved as
file"'"'EVENTS'."'
4030 ENDPROC
```

Listing 2. PROCeventson

```
10 REM Interrupting BASIC procedure
20 REM By Mark de Weger
30 REM For BBC B/B+/M/E
40 REM (c) Acorn User August 1987
50 :
30000 DEF PROCeventson(mc%,line%,time%,n
rtasks%):TRACE OFF:*FX 13,5
30010 *OPT 1,0
30020 eventsoff=mc%+&156
30030 eventson=mc%+&11E
30040 return=mc%+&16C
30050 ?&7F=&FF:!&7B=-time%
30060 !&74=line%
30070 ?&77=nrtasks%:?&78=nrtasks%-1
30080 *RUN EVENTS
30090 TRACE ON:TRACE OFF
30100 CALL eventson:ENDPROC
```

Listing 3. Interrupting Basic Demo 1

```
10 REM Interrupting BASIC demo 1
20 REM By Mark de Weger
30 REM For BBC B/B+/M/E
40 REM (c) Acorn User August 1987
50 :
60 MODE 6
70 VDU 23;8202;0;0;0;
80 PRINT '"This is done by the main,
foreground,"'"routine:"
90 PRINT ''"And this is done in the"'
"background:"
100 PRINT ''"And this too:"
110 counter=0
120 htab=14
```

Continued ▶

◀ **Interrupting Basic listing 3 continued**

```
130 PROCeventson(&900,240,1,2)
140 :
150 REM Main, foreground, routine:
160 :
170 REPEAT
180 counter=counter+1
190 PRINT TAB(9,2);counter
200 UNTIL FALSE
210 :
220 REM Background routines:
230 :
240 PRINT TAB(11,6) RND(10000):CALL re
turn
250 PROCbackground2:CALL return
260 :
270 DEF PROCbackground2
280 htab=htab+1
290 IF htab=30:htab=14:PRINT TAB(15,9)
;SPC(16)
300 PRINT TAB(htab,9);"*"
310 ENDPROC
320 :
330 DEF PROCeventson(mc%,line%,time%,n
rtasks%):TRACE OFF:*FX 13,5
340 *OPT 1,0
350 eventsoff=mc%+&156
360 eventson=mc%+&11E
370 return=mc%+&16C
380 ?&7F=&FF:!&7B=-time%
390 !&74=line%
400 ?&77=nrtasks%:?&78=nrtasks%-1
410 *RUN EVENTS
420 TRACE ON:TRACE OFF
430 CALL eventson:ENDPROC
```

INTERRUPTING BASIC

Listing 4. Interrupting Basic Demo 2

```
   10 REM Interrupting BASIC demo 2
   20 REM By Mark de Weger
   30 REM For BBC B/B+/M/E
   40 REM (c) Acorn User August 1987
   50 :
   60 MODE 4
   70 PROCsetup
   80 PROCeventson(&900,230,1,4)
   90 :
  100 REM Main part of the program:
  110 :
  120 REPEAT
  130 MOVE 400,600
  140 FOR loop=0 TO 126 STEP .3
  150 DRAW 200*SIN(loop)+400,200*COS(loo
p)*SIN(loop*.95)+600
  160 IF INKEY-90:CALL eventson ELSE IF
INKEY-106:CALL eventsoff:*FX15,0
  170 NEXT
  180 VDU 28,2,20,24,6,12,26
  190 UNTIL FALSE
  200 :
  210 REM Background routines:
  220 :
  230 PROCtime:CALL return
  240 PROCtriangle:CALL return
  250 L%=L%+1:PRINT TAB(6,28);L%;TAB(14,
28);L%:CALL return
  260 PROCmusic:CALL return
  270 :
  280 DATA 165,101,157,101,149,101,177
  290 DATA 97,177,89,177,81,0,0
  300 :
  310 DEF PROCgrey
  320 CLS
  330 FOR loop=1 TO 5
  340 PRINT STRING$(253,CHR$255);
  350 NEXT
  360 PRINT TAB(0,0);CHR$11;CHR$13;STRIN
G$(50,CHR$255);
  370 ENDPROC
  380 :
  390 DEF PROCwindow(a,b,c,d,e)
  400 ga=a*32
  410 gb=1024-b*32
  420 gc=c*32
  430 gd=1024-d*32
  440 PROCbox(ga+10,gb+10,gc+10,gd+10,1)
  450 PROCbox(ga,gb,gc,gd,2)
  460 VDU 28,a,d,c,b
  470 IF e=1:text$="MAIN PART" ELSE text
$="BACKGROUND"
  480 IF e<3:PRINT TAB((c-a-LEN text$)/2
,1);text$
  490 VDU 26
  500 ENDPROC
  510 :
  520 DEF PROCbox(a,b,c,d,e)
  530 VDU 24,a;d;c;b;
  540 IF e=1:GCOL 0,128 ELSE GCOL 0,129
  550 CLG
  560 VDU 26
  570 IF e=2:GCOL 0,0:MOVE a,b:DRAW c,b:
DRAW c,d:DRAW a,d:DRAW a,b
  580 ENDPROC
  590 :
  600 DEF PROCsetup
  610 rnd=0
  620 L%=0
  630 VDU 23,255,85,170,85,170,85,170,85
,170
  640 VDU 23;8202;0;0;0;
  650 COLOUR 0
  660 COLOUR 129
```

Continued ▶

◀ Interrupting Basic listing 4 continued

```
  670 PROCgrey
  680 PROCwindow(5,2,35,5,3)
  690 PRINT TAB(7,3);"INTERRUPTING BASIC
 DEMO II"
  700 PROCwindow(8,8,32,17,3)
  710 PRINT TAB(9,9);"Please enter time:
"
  720 INPUT TAB(9,11)"hours:   "hrs
  730 INPUT TAB(9,12)"minutes: "mns
  740 INPUT TAB(9,13)"seconds: "scs
  750 TIME=hrs*360000+mns*6000+scs*100
  760 PROCgrey
  770 PROCwindow(1,3,25,22,1)
  780 PROCwindow(26,4,38,9,2)
  790 PROCwindow(26,14,38,24,2)
  800 PROCwindow(4,24,23,31,2)
  810 PROCwindow(25,26,38,30,3)
  820 PRINT TAB(26,27);"<COPY>: off";TAB
(26,28);"<DEL.>: on"
  830 ENDPROC
  840 :
  850 DEF PROCtime
  860 time=TIME
  870 hrs=time DIV 360000
  880 mns=(time-hrs*360000) DIV 6000
  890 scs=(time-hrs*360000-mns*6000) DIV
 100
  900 hrs=hrs MOD 24
  910 PRINT TAB(28,7);hrs;":";mns;":";sc
s;SPC(-((hrs<10)+(mns<10)+(scs<10)))
  920 ENDPROC
  930 :
  940 DEF PROCtriangle
  950 GCOL 0,RND(2)-1
  960 MOVE RND(365)+838,RND(252)+258
  970 MOVE RND(365)+838,RND(252)+258
  980 PLOT 85,RND(365)+838,RND(252)+258
  990 GCOL 0,0
 1000 ENDPROC
 1010 :
 1020 DEF PROCmusic
 1030 READ pitch1,pitch2
 1040 IF pitch1=0:RESTORE:rnd=(RND(3)-2)
*48:GOTO 1030
 1050 SOUND 1,-12,pitch1+rnd,11
 1060 SOUND 2,-12,pitch1+rnd,11
 1070 SOUND 3,-12,pitch2,11
 1080 ENDPROC
 1090 :
 1100 DEF PROCeventson(mc%,line%,time%,n
rtasks%):TRACE OFF:*FX 13,5
 1110 *OPT 1,0
 1120 eventsoff=mc%+&156
 1130 eventson=mc%+&11E
 1140 return=mc%+&16C
 1150 ?&7F=&FF:!&7B=-time%
 1160 !&74=line%
 1170 ?&77=nrtasks%:?&78=nrtasks%-1
 1180 *RUN EVENTS
 1190 TRACE ON:TRACE OFF
 1200 CALL eventson:ENDPROC
```

◀ Listing 5. Interrupting Basic Demo 3

```
   10 REM Interrupting BASIC demo 3
   20 REM By Mark de Weger
   30 REM For BBC B/B+/M/E
   40 REM (c) Acorn User August 1987
   50 :
   60 ON ERROR VDU 3:CLOSE#0:REPORT:PRIN
T " at line ";ERL:END
   70 MODE 6
```

Continued ▶

◀ **Interrupting Basic listing 5 continued**

```
   80 PRINT '''Set up your (parallel) pr
inter and"'"press <SPACE> when ready."
   90 *FX 15,1
  100 REPEAT UNTIL GET=32
  110 MODE 2
  120 VDU 23;8202;0;0;0;
  130 VDU 29,640;512;
  140 fn$="DEMTEXT"
  150 ch%=OPENUP(fn$)
  160 PROCeventson(&900,340,1,1)
  170 :
  180 REM Main part of the program:
  190 :
  200 REPEAT
  210 CLS
  220 FOR loop1=0 TO 500 STEP 20
  230 GCOL 3,RND(8)-1
  240 FOR loop2=-200 TO 200 STEP 40
  250 MOVE -loop1,loop2
  260 DRAW loop1,-loop2
  270 MOVE -loop2,loop1
  280 DRAW loop2,-loop1
  290 NEXT
  300 PROCdummy
  310 NEXT
  320 UNTIL FALSE
  330 :
  340 REM Background routine:
  350 :
  360 PROCprint:CALL return
  370 :
  380 DEF PROCprint
  390 IF ADVAL-4<5:ENDPROC
  400 VDU 2
  410 FOR loop=1 TO 2
  420 IF EOF#ch%:PTR#ch%=0:VDU 1,13,1,13
  430 chr=BGET#ch%
  440 VDU 1,chr
  450 NEXT loop
  460 ENDPROC
  470 :
  480 DEF PROCdummy:CALL eventsoff
  490 REM This is a dummy procedure.
  500 REM It shows you how to switch
  510 REM events off and on in a
  520 REM procedure that is called by
  530 REM the main part of your program.
  540 CALL eventson:ENDPROC
  550 :
  560 DEF PROCeventson(mc%,line%,time%,n
rtasks%):TRACE OFF:*FX 13,5
  570 *OPT 1,0
  580 eventsoff=mc%+&156
  590 eventson=mc%+&11E
  600 return=mc%+&16C
  610 ?&7F=&FF:!&7B=-time%
  620 !&74=line%
  630 ?&77=nrtasks%:?&78=nrtasks%-1
  640 *RUN EVENTS
  650 TRACE ON:TRACE OFF
  660 CALL eventson:ENDPROC
```

See Cut Down on Keystrokes, page 157

Listing 1. Extended highlights

```
*| EXTKEYS quick entry of extended
*| highlights - by Graham Bell
*| for B/B+/M/E + View
*| (c) Acorn User August 1987
*|
*fx 228 1
*key 0
```

Continued ▶

◀ **Business listing 1 continued**

```
*key 1
*key 2 "|!!|! |! "
*key 3 "|!!|! "
*key 4 "|!!|!!|! "
*key 5 "|!!|!!"
*key 6 "|!!|! |!!"
*key 7 "|!!|!!|!!"
*key 8 "|! |! "
*key 9 "|!$HT|M2 130|M|!!|! |! |! "
*key 10
*key 11 "|!!@"
*key 12 "|!|X|!|X|!|X|!|X|!|X|!|X|!|X
|!|X"
*key 13 "|!|Y|!|Y|!|Y|!|Y|!|Y|!|Y|!|Y
|!|Y"
*key 14 "|!|Z|!|Z|!|Z|!|Z|!|Z|!|Z|!|Z
|!|Z"
*key 15 "|!|[|!|[|!|[|!|[|!|[|!|[|!|[
|!|["
```

Listing 2. NLQ exec file

```
 10 REM Create NLQ EXEC file
 20 REM by Graham Bell
 30 REM for BBC B/B+/M/C/E
 40 REM (c) Acorn User August 1987
 50 :
 60 *FX 5 0
 70 *SPOOL NLQ
 80 PRINT "*| ";
 90 VDU 2,1,27,1,ASC"x",1,1,3
100 PRINT "NLQ print set"
110 *SPOOL
120 *FX 5 1
```

Listing 3. POUND exec file

```
 10 REM Create POUND EXEC file
 20 REM by Graham Bell
 30 REM for BBC B/B+/M/C/E
 40 REM (c) Acorn User August 1987
 50 :
 60 *FX 5 0
 70 *SPOOL POUND
 80 PRINT "*| ";
 90 VDU 2,1,27,1,ASC"R"
100 VDU 1,0,1,27,1,ASC":",1,0
110 VDU 1,0,1,0,1,27,1,ASC"%"
120 VDU 1,1,1,0,1,27,1,ASC"&"
130 VDU 1,0,1,ASC"£",1,ASC"£",1,138
140 VDU 1,18,1,0,1,ASC"~",1,128
150 VDU 1,18,1,128,1,18,1,128
160 VDU 1,ASC"B",1,0,1,0,3
170 PRINT "POUND character set"
180 *SPOOL
190 *FX 5 1
```

August Listings

The easiest way to enter the listings is to buy the monthly listings disc or cassette. It saves time and removes the inevitable typing errors. The disc is fully menu driven and an excellent buy at only £5.95. The listings can be downloaded from Micronet page 600 600 890A, price £5.00.

Remember there is a graphics bonus on the disc and cassette each month to add to your graphics library. The order form is on page 130 or buy a copy at the Acorn User *show.*

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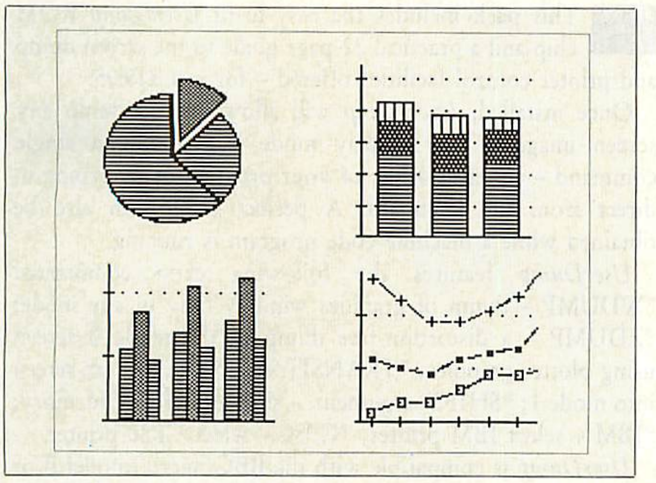
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C H A R T   S O F T W A R E



Improve your presentation with ViewChart

BBC/B/B-/M Do you use your micro to prepare figures? Perhaps in *ViewSheet* or *ViewStore*? Do you make printed reports? This business graphics program from *Acorn User* contributor Peter Sandford is aimed at anyone who uses figures, and wishes to improve the quality of their work.

ViewChart takes your numeric data from a *ViewSheet* or *ViewStore* file, or manual input, and plots various chart formats to screen. In one plot you can produce between one and five piecharts, stacked bar charts up to 25 bars, grouped bar charts up to 24 bars and line graphs with up to five lines each of 40 plotted points.

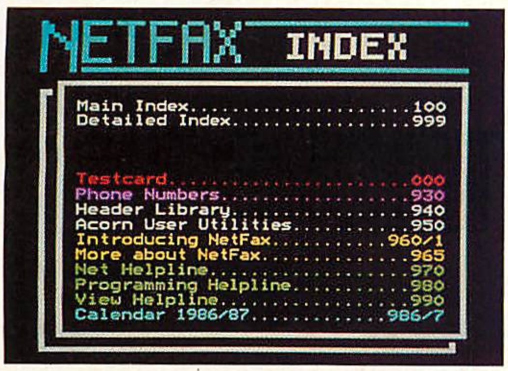
In practice, most business presentation data such as sales figures, departmental breakdowns, cost analyses and so on can be presented in a form even the boss will understand!

You can even add extra text and graphics to the completed chart prior to saving or printing. A screen dump program is provided, for Epson and compatible printers, which is specifically designed to fit the width of an A4 page. Instructions are provided on interfacing to other printers. *ViewChart* works in screen mode 0, using full shading effects, so what you see on screen is what you get on paper, and includes some tips on final presentation of graphics in documents.

ViewChart is supplied on 40-track 5.25-inch disc and works on the BBC models B and B+ and Master 128.

And the price of this professional software? Just £12.95.

D I S C S



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Included is *Netfax*, our own hybrid information system providing access to thousands of pages of information. Other special features are: a file locator and directory size finder; network manager utilities including a bridge compatible screen viewer and a 'notify all' facility.

Plus there are 150 *Netfax* pages covering instructions, help and indexes, all on a 5.25-inch disc for £19.95.

D I S C S



Disc for all sideways RAM users

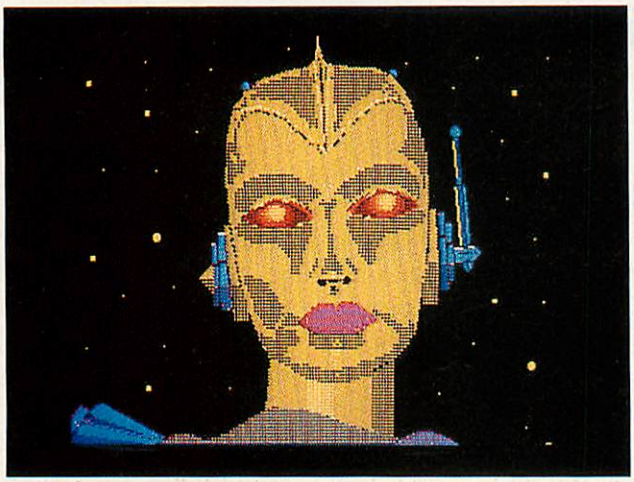
BBC/B/B+/M/C The *Sideways RAM Utilities* disc includes: *RamPad* – your computer's answer to the pad and pen. *On-Screen Fonts* – a variety of print styles available in all graphics modes. * HLP ROM – add your own help text to call up when you're stuck. Standard ROM header for use when writing your own ROMs. * RLOOK to examine the contents of your ROMs and sideways RAM images.

There are many more utilities on this 40-track 5.25-inch disc with a transfer program for 80-track users, and it's competitively priced at £9.95.

Acorn User order form on page 130 – 24 hour telephone service (0672) 40825

OFFERS

DUMP ROMS



Printer control with the UserDump ROM

BBC/B/ B+/M/ C/E This pack includes the easy-to-fit *UserDump* ROM chip and a practical 22-page guide to the screen dump and printer control facilities offered – for just £19.95.

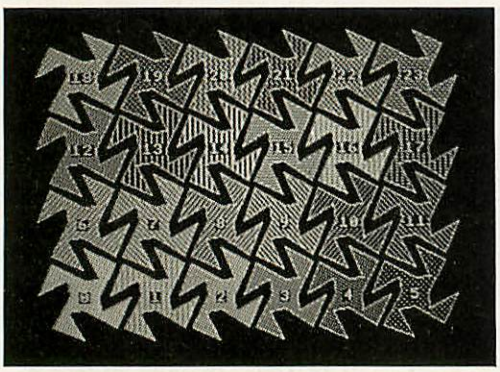
Once installed, *UserDump* will allow you to dump any screen image in any display mode by entering a single command – either as a line of your program or by typing in direct from the keyboard. A perfect dump can also be obtained while a machine code program is running.

UserDump features the following extra commands: *WDUMP – dump of graphics window only in any mode; *ZDUMP – a distortion-free dump of the mode 0 screen using plotter graphics; *TRANSIT – translate teletext screen into mode 1; *SHIFT ‹argument› – shift any area of memory; *IBM – select IBM printer; *CP80 – select CP80 printer.

UserDump is compatible with the BBC micro (model B or B+) fitted with operating system 1.2. Any earlier version will cause problems. *UserDump* is fully compatible with the Acorn 6502 second processor. It works with any printer which has single density and double density bit image graphics, including all Epson (LX, RX and FX) printers, Star Gemini and Delta, SG, SD and SR, Canon and Kaga NLQ. Also usable are the Shinwa and other CP80 printers.

There are many more commands available with *UserDump*, and details are available from Seran, Redwood Publishing Ltd., 141-143 Drury Lane, London WC2B 5TF.

ROMS

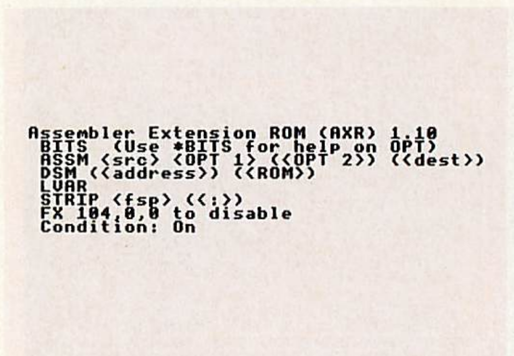


Your favourite Acorn User routines

BBC/B/ B+/M/ C/E Get *UserROM* for your favourite *Acorn User* routines. Plug in the ROM chip and 19 routines are instantly accessible via star commands, including colfill with 27 colourful fills; dotfill providing 23 new black and white shades; bad program recovery; variable lister; function key lister; a graphics compiler; a circle drawing routine and a sound compiler. There are many demonstration programs and a 22 page manual. All for £19.95.

Full details are available from Seran, Redwood Publishing Ltd., 141-143 Drury Lane, London WC2B 5TF.

ROMS



Acorn User Assembler Extension ROM

BBC/B/ B+/M/ C/E The *AXR* ROM, competitively priced at £19.95, is especially designed for use by machine code programmers. *AXR* adds a variety of options and commands to the Basic assembler, along with several new pseudo op codes, full Basic expression evaluation, and even the use of binary numbers. A disassembler is included in the software, and all 65C02 instructions can be used. *AXR* is compatible with Basic 1, 2 and Master.

Further details from Seran, Redwood Publishing Ltd., 141-143 Drury Lane, London WC2B 5TF.

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OFFERS

PROGRAM LISTINGS



Whaam! What wonderful listings

Joe Telford was stunned at the price of paper for personal diary planners, so he produced his own. By using Joe's program you can produce your own. For Master owners Joe has added a calendar utility to the *JOE* desk-top program from June 1987, which is still available on disc and cassette.

Mark de Weger has written a multi-tasking utility which you can use in your own programs. This allows several parts of the program to work at the same time, so one procedure could display graphics on screen while another prints on the printer.

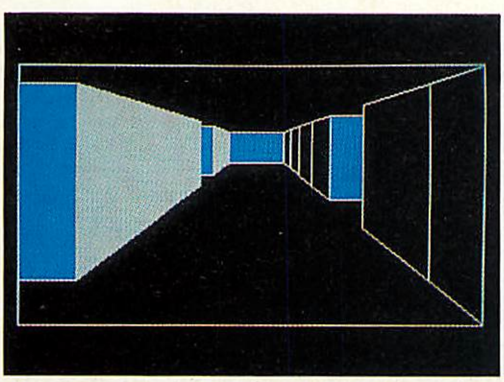
For the business user, Graham Bell's programs allow you greater control of your printer while working in *View*, giving even more finish to your business documents and letters.

Don't miss the one-line wonders, the best one-line graphics programs from our competition in the March 1987 issue. We have put all the winners onto the disc and cassette listings.

First Byte and Forum have produced several useful programs. For machine code beginners, Tessie has devised a program for multiplying and dividing in machine code, and if you find that after a long programming session you press 'Break', we have a program to stop you losing variables.

The Graphics Bonus for August is WHAAM, adapted by Robert Miller from Roy Lichtenstein's original that hangs in the Tate Gallery. All these programs are on 5.25-inch disc for £5.59 or on cassette for only £3.95.

LISTINGS



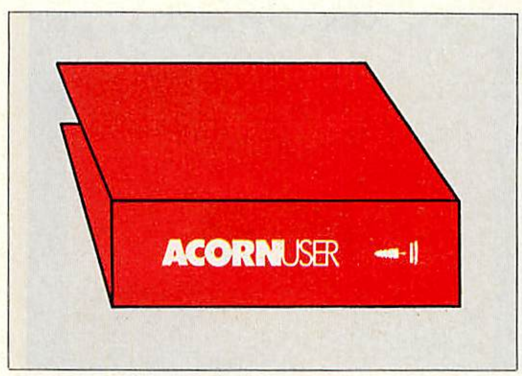
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BBC/B/B+/M/C/E *Acorn User*'s *Gallery* and *Gallery Collection* discs are now in 3.5-inch format for Master Compact users. Each disc is a giveaway at only £6.95, the same price for all formats. Both discs have over 20 brilliantly digitised and stunningly produced screens that will automatically scroll for your amusement, or you can load them all individually to have a longer look.

The screens on the *Gallery* disc include some old favourities, such as Thomas the Tank Engine, as well as some new ones that will amaze, tantalise and entertain you.

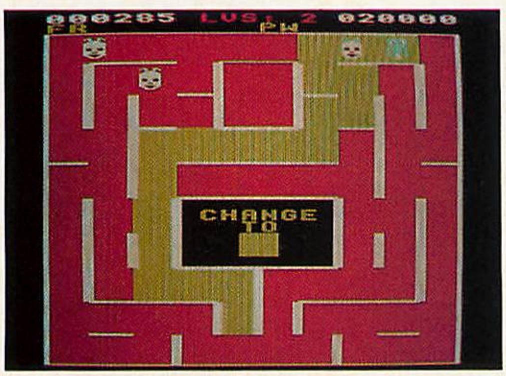
The *Gallery* disc also has *Super Painter* and *Pixel Editor*, so you can do the creating. These two programs can be used in conjunction with the screens we give you to alter and improve them, or you can create totally new graphics screens of your own.

The rich and the famous, or sometimes infamous, put in an appearance. Tony Hancock is on the *Gallery* disc, as is Max Headroom. On the *Gallery Collection* disc, *Spitting Image* and the *Dallas* crowd are in vivid colour in the company of Henry VIII, and everyone's favourite, Bugs Bunny.

All the screens on the *Gallery Collection* disc come in compressed form with a program to help you compress and expand your own screens, so saving valuable space.

Whether you choose 3.5-inch or 80-track or 40-track 5.25-inch format, you'll be getting great entertainment value.

CASSETTES



Games galore in our compendium cassette

BBC/B/B+/M/E You can guide Shuggy around his garden; puzzle over *Puzzle*, and be *3-D* amazed. Or destroy submarines with *Run Silent, Run Deep*. And for the really adventurous, go round the *Acorn User* office.

Best of all, try the truly different *Adventure* game written especially for the *Games Compendium* cassette by Rob Anderson. It's excellent value at £3.95.

You will also find David Acton's *Spectramania* and *Quadline* on this cassette: beat your micro, get four in a row. All are easily transferred to disc.

DISCS



Graphics utilities for your screens

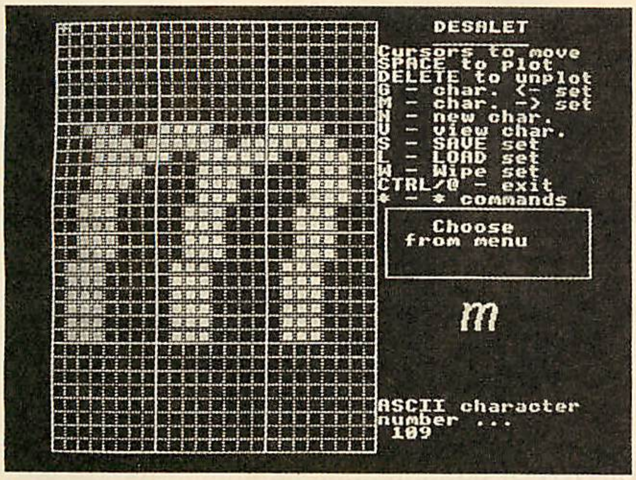
BBC/B/B+/M/C The 40-track 5.25-inch *Graphics Utilities* disc, keenly priced at £7.95, features 16 routines to manipulate blocks of graphics: rotation and reflection, a screen compressor/expander, a colour flood-fill routine and three mode conversion commands.

With the Basic procedure library are multi-height, proportional and justified text and 'drop shadow' boxes. A teletext screen editor gives point plotting, line drawing, rubber banding and flood fill, along with all mode 7 control codes. All can be used in your own programs.

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OFFERS

C A L L I G R A P H Y



A new dimension in letter designing

BBC/B/B+/M/C This is your chance to produce your own letterheads and posters to a professional standard, with the minimum of fuss and effort. *Acorn User*'s *Calligraphy* disc has been compiled due to popular demand and contains all the programs needed to produce letter designs that will impress your friends and colleagues.

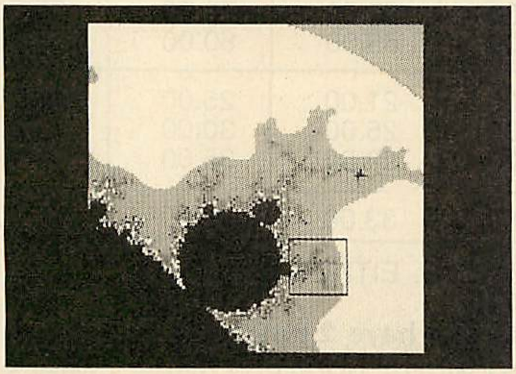
The *Desalet* program is a simple font creator which produces customised letters, to your personal design. It will save you from using repetitive data statements and error prone calculations. You can save your font set on disc and then call it up as needed. All previously saved sets can be modified or added to, and each set covers up to 94 characters.

Modical, a modification of the original *Calligraphy* program (September 1986 *Acorn User*) is also included on the disc. *Modical* allows the use of disc-based font sets created with *Desalet*. *Modical* also incorporates a modified file creation program, which permits files to be printed out immediately or saved for later printing.

An enhanced font ROM in the form of a sideways RAM image, is also on the disc. This allows you to design your own fonts for use on-screen. Any output to the printer will be in the new font – thus giving true WYSIWYG capabilities. There is a selection of new fonts to help you get started.

This superb disc comes in 5.25-inch, 40-track format easily transferable to 80-track and is great value at only £9.95.

C A S S E T T E

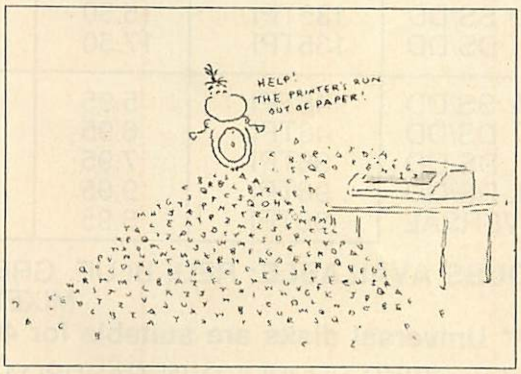


All your finest favourites now on cassette

BBC/B/B+/M/C For only £3.95, *Finest Favourites* contains some of the best programs published in *Acorn User* for the BBC, Master and Electron microcomputers.

The cassette contains: *Tunemaker*, *Character Dumping*, Basic extensions and a screen compression program. The *Mandelbrot* set allows you to do the creating and *Word Squares* lets you make your own word puzzles. Also included is *Screen Fonts* and don't miss *Motion* on this exciting cassette. Remember the *Best of Acorn User* and *Graphics* cassettes are still available! See page 130.

D I S C S



Printer advice with Printer Help disc

BBC/B/B+/M/C/E Often printer manuals don't fully cover the Master and BBC micro – our disc will help you to understand your printer's facilities for just £7.95.

The 5.25-inch *Printer Help* disc illustrates various print type styles, use of *Wordwise* and *View*, screen images and printer care. There is an ASCII standard codes table and clear diagrams illustrating stages of printer use including advice on what to do if things go wrong.

For compatibility details write to Seran, Redwood Publishing Ltd, 141-143 Drury Lane, London WC2B 5TF.

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REVIEWS

GAMES

THE GAMES PAGE

David Lawrence's guide to the best games at this month's *Acorn User* show

It's show time again! And you have yet another chance to squeeze your way through the Barbican exhibition halls and pick up the latest games, some of them hot off the press, and all the golden oldies.

Many software companies have compiled collections of their early games and are selling them at about £10 for between five and 10 titles. If you're looking for a bargain then Superior's *Collections*, Acornsoft's *Hits*, Micro Power's *Magics*, Tynesoft's games packs or Audiogenic's collections are well worth buying. Of the latest games around, I would recommend any of the following to add to your collection:

Superior Software

■ *Grand Prix Construction Set* – The split-screen 3D racing game reviewed in June's *Acorn User*.

■ *Around the World in 40 Screens* – Extra levels for *Repton 3*.

■ *Crazee Rider* – 3D motorcycle racing.

■ *Stryker's Run II Codename: Droid* – The sequel to *Stryker's Run* by the authors of *Ravenskull*. I have now seen a pre-release copy and apart from a few very minor bugs that are currently being corrected, the game is an excellent follow-up to *Stryker's Run*. I didn't think there was enough going on in the original game, but John Stryker has four-directional movement plus kneeling and crawling, and instead of just mindless shooting, you must solve some quite fiddly and complete puzzles in this new game.

Tynesoft

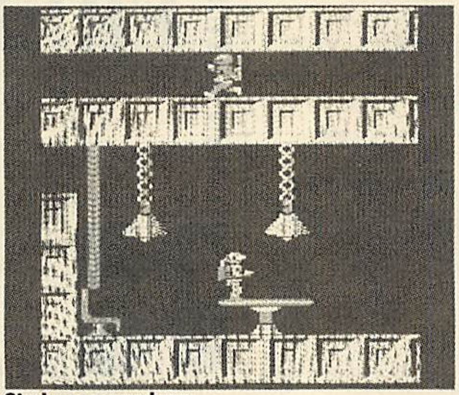
■ *Phantom* – Kill the ghosts and collect the keys to escape.

■ *Oxbridge* – An illustrated mode 7 adventure with plenty of humour.

■ *Spy Vs Spy* (should be available) – Two player spy combat.

Audiogenic

■ *Omega Orb* – The next game from Peter *'Thunderstruck'* Scott, very much in the same vein as that program, with very nice graphics and good-sized playing area.



Strykers second run

Micro Power

■ *Magic II* – Compilation of 10 games.

■ *Imogen* – An excellent arcade adventure with 'strange' puzzles and cute graphics.

Elite

■ *Paper Boy* – The highly popular arcade machine reproduced on the BBC micro, many of the original graphics are obviously not present, but what is there is good and the game is very playable.

BugByte

■ *Dunjunz* – The nearest you can currently get to *Gauntlet* on the BBC micro. *Dunjunz* is now available on disc.

Imagine

■ *Coin-op Hits* – A compilation of four of Konami's best games for about £10: *Yie-Ar Kung Fu* – One player Kung-fu combat. *Mikie* – Evade the teachers to escape to the playground and your girlfriend! *Hyper Sports* – Swimming, skeet shooting, gymnastics, archery, triple jump and weight lifting. *Green Beret* – Yes! At last you can buy this commando-style game on the BBC micro. Unfortunately it's not really up to much.

With any luck, the next game from Imagine, *Arkanoid*, might be available at the show. This is one of my favourites in the arcades and on the Atari ST. Amazingly enough, the game is just the old classic *Breakout*! However, aliens, indestructable bricks, lasers (!) and about 30 different levels have been added to make a highly addictive game. I have not seen the BBC micro version but the Atari one was converted by Peter Johnson, author of many of the latest BBC conversions like *Impossible Mission*, so I imagine that we may get a very good game.

It is interesting to note that in the latest software charts, Superior holds the top four positions and has a total of six games in the top 10. Perhaps other software houses should take note. . .

Michael Horend has followed up his *Plan-B* poke from last month with the following. Again *LOAD PLANB, then

For infinite energy:
?&3F74=&EA:?&3F75=&EA

For infinite ammo:
?&3F82=&EA:?&3F83=&EA

For 50 keys at start:
?&3F01=50

Even with these pokes, it is still fairly difficult to finish the game, as some of the screens are very nasty to get out of, and even into in some cases! One word of warning Mike gives; don't go along the passage down the drain – you end up in a little box and can't get out!

One other fairly interesting poke I have received comes from Duncan Nobes. Although only an infinite life poke for Tynesoft's *Mousetrap*, it does at least give you a chance to get off the first screen! Anyway, for oodles of lives, load in TRAP3, ?&18FC=&A9 and ?&18FD=1, re-save TRAP3. Now just chain the game normally and carry on playing.

That's all for this month; don't forget about the *XOR* and *Ravenskull* maps, and have a good show! The *XOR* maps cost £1 on paper, £2 if you supply the disc (please state which format you require); *Ravenskull* costs £1.50 on paper, both are available from us at The Games Page.

REVIEWS

GAMES

RAISE YOUR HEARBEAT



'Phantom' from Tynesoft, BBC B/B+ Master/Compact, £7.99 (cassette), £9.99 (disc)

Described as 'a cross between *Ghostbusters* and *Gauntlet*', Tynesoft's new offering *Phantom*, puts you in the role of a professor, arms you with a trusty EPA (Experimental Nuclear Accelerator), and sets you off to rid four buildings of ghosts.

The game begins with a cute introduction featuring a haunted chimney pot and the professor arriving in his car. You start in 'Ye Olde Inn' and must collect a key before progressing to the next room.

The game uses mode 5 with interrupts, to achieve a six-colour display. The screen is divided into two sections. The upper part shows a plan view of the current room and the lower part, your current status.

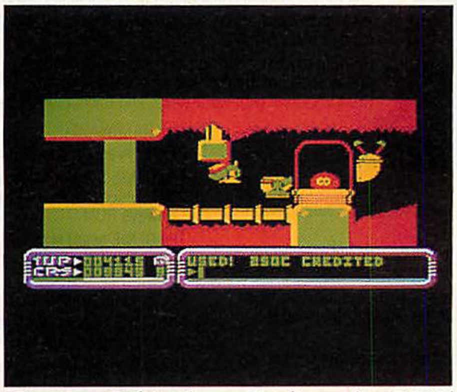
Ghosts appear at random and proceed to make life as difficult (and short) as possible. Your present state of health is shown on an oscilloscope display. You start with an ECG (pulse) rate of 70, which rises on contact with a ghost.

I didn't get very far through the game but came to the conclusion that there was little to do. I also found the game too difficult to play. Ghosts appear to raise your ECG rate without actually making contact, making death inevitable. Also, it can take more than one shot to kill a ghost, which drains your energy all too readily. This may be intentional, but irritating.

With all the points against it, I can't really recommend *Phantom*. If you are after something in the *Gauntlet* vein, there are better games on the market, like Bugbyte's *Dunjunz*. What could have been a great game, given some careful thought, is simply boring. It's really a case of 'nice graphics – shame about the game'.

Robert Miller

BOUNCING ALONG



'Omega Orb' from Audiogenic, BBC/ Electron, £7.95 (cassette), £11.95 (disc)

In *Omega Orb*, you play the part of a spherical, robotic travelling salesman.

The aim of the game is to find objects which open doors, and ultimately you'll need the twelve core pieces to mend your ship. All this is done in true *Thunderstruck* style. Unlike *Thunderstruck* (*I* and *II*), the game allows you to get your own back on meanies which maraud around the rooms. This is done by giving them a good zap with your laser gun. Unusual that, a travelling salesman carrying a laser, but it does add a little more life to the game.

Movement is not walking as you would expect, but bouncing. A 'super bounce' is also incorporated to help you get up on to those high ledges. The movement is very well done. You actually see the ball compress as it hits the ground.

Once found, objects can be used by bouncing into a terminal and then entering commands like USE, INPUT, CODE, QUIT, MAP and so on.

The nasties make an appearance in almost every room. If you bump into them you'll find they blow up, but their explosions remain on the screen until you move away. All the time you are in contact with this explosion your energy decreases.

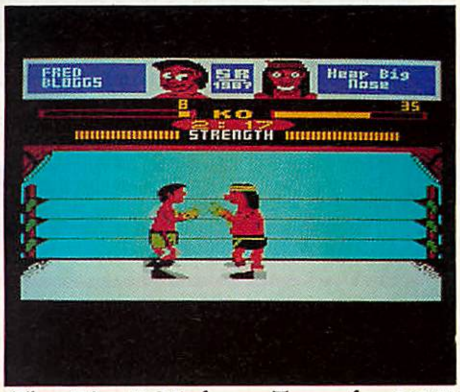
The graphics in the game are very good, the sprites are well-defined and large. The sound is nothing to write home about.

Unlike similar games, the puzzles within *Omega Orb* seem to have very little logic behind them. This means a lot of trial and error is involved.

Overall, I found the game more challenging than its predecessors. If you enjoy a good blast and the odd head-scratcher then I'd say this game is for you.

Gavin Gillings

NOT A KNOCKOUT



'The Big KO!' from Tynesoft, £12.95 (disc), £7.95 (cassette)

I try not to miss a fight on the telly, so when asked if I had seen boxing on the Beeb I was most upset, until I discovered that the boxing was *The Big KO!* and the Beeb wasn't BBC1, but my little micro.

After games like *Matchday* and *Olympic Decathlon* with large sprites and flicker free movement, another 'sporty' game seemed inevitable. Tynesoft has come up with *The Big KO!* – a boxing game where you have to pit your wits against increasingly aggressive opponents.

Unlike previous Tynesoft disc-based games this one is supplied in a clear compact disc-style box. The Instructions are rather too concise – it doesn't tell you that you need to press three keys to punch.

There is an option for a two-player game. This is all right if you have joysticks, but gets rather chaotic with two people trying to get at the keyboard simultaneously! I wouldn't say that *The Big KO!* stretches my Beeb to the limits.

Disc users are privileged to have an editor program to edit graphics and boxers' statistics. This, however, is supplied without instructions and is difficult to follow.

In general, the game could be improved. I think I'll stick to watching the telly.

Richard Bellis

SOFTWARE

PURE GENIUS

Steve Mansfield reviews the new pop-up desktop program from PMS and finds it answers his three wishes

Whatever you're doing, there's always a point when you need to do something else. You might be writing a letter in *View* or *Wordwise* and need to look up an address or phone number to put in it. Or you could be working on your latest program when suddenly you feel an urgent desire to make a few notes.

Owners of MS-DOS business computers have long had the solution, with memory resident 'pop-up' utilities like *SideKick*. Now BBC micro users have the same facilities with Permanent Memory Systems' latest package, *Genie*.

Genie is very similar to the *SideKick* package in that it offers a number of desktop utilities – notepad, diary and so on – at the press of a key. But there are a few extra and significant improvements with the BBC micro package.

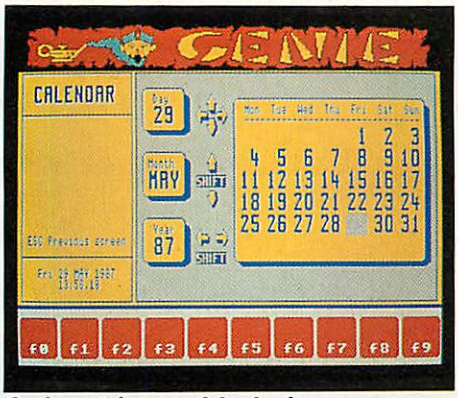
Genie uses special hardware. It consists of a small box which connects to the normal ROM sockets, and the BBC micro thinks it's just like any other ROM. I've got the package plugged into an EPROM cartridge for my Master, which means I can easily transport it between home and work, should I want to.

But there's a lot more to *Genie* than the machine thinks. The box holds the software along with 32k of memory for the date – like addresses and the contents of the notebook – and another 32k of RAM into which the whole main memory of the BBC micro is moved when you call *Genie* into action.

To do this you simply hit CTRL-Shift-G, or if you're at a point where you can issue a star command, *GENIE will do the job. This calls up the main menu. The choice is between an address book, telephone book, notepad, desk diary, calendar and calculator.

If you're using a Master 128, the date and time are automatically taken from the Master's real time clock. The telephone book is also generated automatically by taking the names and numbers from the address book files.

The screen presentation is attractive and consistent. It uses an 80-column mode, which means you can get a reasonable amount on to the screen.



***Genie* contains a useful calendar**

The most immediately useful feature is the notebook. This is presented as a series of pages. Moving between them is a trifle awkward – you choose the browse option, move around until you find the page you want, then Escape, select the work option and finally do the required editing.

When you get to the end of a page you have to Escape out to the menu to select a new one. Again this is awkward, especially if you're busy taking notes while on the telephone – something I use *Genie* for quite a bit. It's only a minor problem, but it would be better to have the scrolling text editor offered by *SideKick*.

The address book uses a fixed format, giving spaces for surname, first name, address, phone number and some details.

Diary dates

The other main part of the system is the desk diary. This gives a page of information, similar to the notebook, for each day of the week. There is also a calendar, with today's date highlighted. And you can move very rapidly through it a day, month or even year at a time.

I suffer a sensation of dread whenever I'm told that a package has an on-screen calculator. They're usually awful affairs which require you to move a pointer around, and so are tediously slow.

I'm relieved to say the *Genie* calculator is excellent, particularly as it uses the normal numeric keys. It's unfortunate it doesn't have hex and binary modes, like the calculator in ACP's *Advanced Control Panel* (see page 142), but it is large and clear, as well as easy to use.

The best thing about *Genie* is that the memory which holds the data is all battery-backed – so you don't have to keep remembering to save it to disc before switching off the machine, although you can do so if you want a backup.

Completely compatible

The other good thing about it is that it seems to work with almost anything – including second processors. I used it from within *Spell Master*, which had itself been called from within *View*. When I escaped out of *Genie* I went back to the spelling checker with no problems. That meant I was using 176k of program – who says the BBC micro is short of memory!

Genie failed only with the Master 512. It worked fine at DOS system level, but after being called from within *PC Write* it dumped me back into mode 3 instead of mode 0. Permanent Memory Systems is working to resolve the problem, which could be useful as *SideKick* itself doesn't work with the 512.

There is the option to lock *Genie* with a password. That helps you to protect confidential information, but I find having to enter the word each time I call the program slows me down too much.

The program can also be set up the way you like it for screen colours, interlacing and date stamping of note pages. These options are stored in the battery-backed RAM and so don't have to be re-entered.

Genie is a superb package. It's one of the few utility packages that I now couldn't be without. And apart from a minor problem with my pre-release version, which has since been corrected on production models, the software seems remarkably problem and bug-free.

Genie costs £80.35 (including VAT and postage) and is available from Permanent Memory Systems, 38 Mount Cameron Drive, East Kilbride, Scotland G74 2ES. Tel: (03552) 32796.

SOFTWARE

USEFUL UTILITIES

Steve Mansfield looks at ACP's *Advanced Control Panel* and Avon Computer's *Crashproof*, while Dave Atherton examines the *System Utility* ROM from KM Software

It's becoming fashionable to protect the micro user from the more mundane operations of the computer by the use of 'front-end' software. Xerox and Apple pioneered the use of the WIMP (windows, icons, menus, pointers) environment on micros, but the idea has filtered through to all makes of computer, and the *Advanced Control Panel* (*ACP*) is the latest front-end system for Acorn machines.

ACP shares its initials with its creators, Advanced Computer Products. That company also has another new product on the market, the Advanced Battery-backed RAM (ABR), and we decided to look at the two products together.

The *ACP* software comes on a ROM chip and works with the Electron and all versions of the BBC B and Master series micros. ABR, on the other hand, comes as a cartridge for the Master 128 or Electron with the Plus One adapter. It could also be used on the Master Compact if you have the company's cartridge adapter.

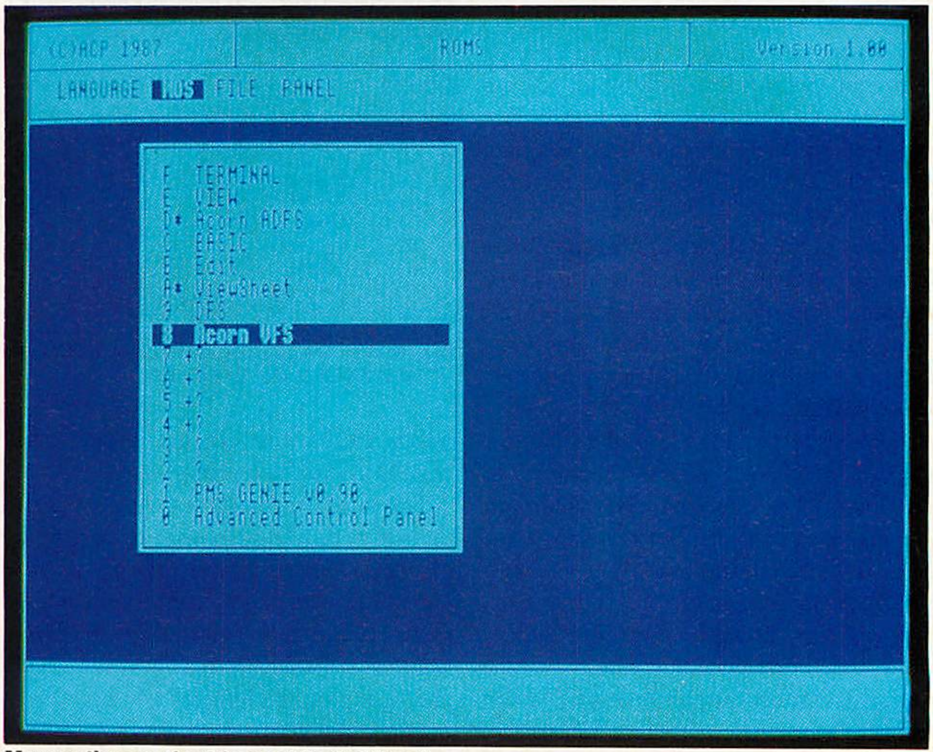
At its simplest level, the *Advanced Control Panel* allows you to move around a disc, examining or loading files, select ROMs, load and save ROM images and configure your machine in which ever way you like it.

Typing *ACP, boots up to the program and presents you with an 80-column screen. Several options are shown in a box along the top of the screen, with the current option highlighted.

The first option, Language, shows which language ROMs are fitted. You can select a language by placing the cursor on the relevant name and hitting Return.

The second option, labelled MOS, contains some of the more interesting alternatives. The first shows which ROMs are in the machine, and indicates banks of sideways RAM. ROM images can be loaded and saved, and ROMs can be turned on and off, all very quickly and easily.

Also under MOS is the Configure option. Master owners will be familiar with this idea. Using the configure utility, you set up your machine the way you like it – auto-repeat rates, screen mode, baud rates, and so on. It contains several extensions over the Master system, including the facility to save and load configurations. That means you can have several different set-ups for different applications. Or people sharing a machine can set it up the way they like it.



Menu options on the *Advanced Control Panel*

ACP can be used from sideways RAM, and is slightly improved this way. The reason is that the configuration options are then stored in sideways RAM just above the program, where they can be used again later if required.

For example, the default screen colours are black text on a red background, which I found difficult to see on my mono monitor. You can change these colours from the configure option, and they're then preserved until the next time you use *ACP* or switch the machine off.

Other options under the MOS heading are: Clock, which you use to set the time; Calculator, which gives an on-screen calculator which works in three formats: binary, hex and decimal; and Alarm.

The last option is very interesting, although it's available only to Master users. By setting a link inside the machine (a linker is provided for this) the machine can be made to emit a beep or issue a star command at any specified time and date. You could use it to *EXEC or *RUN a file, or display the time with *TIME – there are endless possibilities. If you forget that you've set the alarm and are doing something important when it goes off, then effects could be disastrous. But as it simply feeds the command into the keyboard buffer, you should be fairly safe so long as you use it carefully.

The next option on the main panel is File. As you might expect, it gives the option of showing the current directory, selecting the drive and filing system, and setting the disc title and !BOOT option.

Programs can be run simply by placing the cursor over the filename and hitting Return. The same technique is used for moving down through ADFS and Econet

directories. Files can also be deleted, locked and unlocked, and so on.

The final option, Panel, is what will make the program really popular in places like schools. It allows you to create your own control panels.

You start by typing in the main headings you want to use, which replace the standard Language, MOS and so on. These headings are then given a number of options, all defined by you, which appear in a window and which can themselves have several options. In this way, you build up a hierarchical system of windows and options until, finally, the options carry out some kind of action.

The range of actions includes printing a window full of text, chaining, running or loading files, issuing star commands, calling a machine code address or accessing any of the features of the standard control panel, including the calculator and alarm.

Control panels built up this way are then saved to disc and can be accessed from the Panel option or directly by typing *ACP followed by a panel name. It's very easy to create an entire customised front-end for your own use.

The Advanced Battery-backed RAM cartridge is a simpler product. It contains two 16k RAM banks, which can be used like ordinary sideways RAM, but with one important difference – you don't lose the data in them when you switch the machine off and on.

Utilities are supplied already in the RAM to load and save ROM images, to use the cartridge as a printer buffer, and to convert software into ROM filing system format. This allows programs to be loaded very quickly.

If you're using ROM images, the sideways RAM can be write protected using software provided. The cartridge uses a NiCad battery which is recharged from the computer when it's switched on.

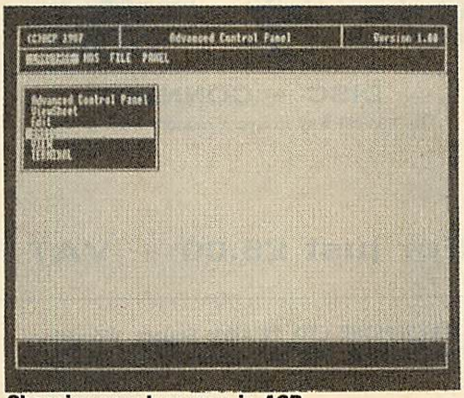
If you're using a Master, load an image of *ACP* into sideways RAM and select it as the default language. Then, every time you switch the machine on you'll go straight into the control panel.

ABR costs £39.99 and *ACP* £34.50. Individually they're excellent products. *ACP* is better than any of the other front-end systems I've seen. And used with the battery-backed RAM it makes the computer a doddle to use.

Crashproof

How often have you wanted to just freeze the machine, to save the program and data and come back to it later? *Crashproof* lets you do this. A simple command saves the machine's memory and status on disc, providing a useful security backup, as well as a way of starting where you left off the next time you use the micro.

Hitting CTRL-S saves the machine status to disc in three files. If you write your own programs, or are using software where you can enter star commands *KEEP has the same effect.



Choosing your language in *ACP*

When you want to return to the original program you type *REVIVE and you're back where you started – well almost. There are occasional minor problems, like cursors appearing where they had previously been turned off. Not a particularly disastrous problem, of course, but it shows that software like this isn't foolproof, and there may be other, as yet undiscovered hitches. But it should perform well with legally-written applications software, like wordprocessors, spreadsheets and so on.

If your machine code programming is up to it, you could use interrupts or the timer event to get the micro to call *Crashproof* at regular intervals. In that way you could make sure precious data is saved regularly in case of a power failure or other disaster. Indeed, the program might prove most useful to people working in less than perfect environments, like site offices, where the power may be coming from an on-site generator.

The program could also prove useful when your machine crashes. If the crash isn't total, and *Crashproof* still works, you could save the machine status so you can sort out the problem later – and then hit CTRL-Break.

Theoretically, *Crashproof* could be used for piracy. But we tested it with a few games and found that some of them – including *Sentinel* and *Cholo* – wouldn't run with the *Crashproof* ROM in place.

So far the program works only with the BBC B using the standard disc filing system (DFS). Versions for other disc filing systems are in the pipeline.

System utility

This latest utility ROM chip from Jersey-based KM Software is a general collection of programmers' utilities. The ROM detects whether it is fitted to a BBC B/B+ or a Master 128, and offers a different set of commands for each micro.

The major features of the ROM are a disassembler and a memory editor. The former is fairly average with useful features such as a 6502/65C12 toggle, and the ability to disassemble I/O memory from the Tube. However, you can't scroll backwards, a drawback in my view. The memory editor is good, being one of the *Disc Doctor* type where you can watch memory alter on screen. You can also edit the 4k private workspace and CMOS RAM on a Master, and the Tube memory on either machines.

Two odd commands are *MODE and *DLOADER, for downloading programs from disc where they are written to run on tape, usually containing machine code which must reside at &E00. The reason these commands are odd is that they don't actually do the job, they instead print the Basic code required to do it on screen. I suppose the idea is that they can then incorporate that code into your own programs, but still, it's a bit strange.

The ROM also contains a picture compressor which squashes disc images of screens. This is quite efficient, and the compressed picture can be expanded again without this ROM installed.

On the BBC micro there are commands to list, unplug, reinstate ROMs, and save them to disc/tape, and to direct a star command to a particular ROM to avoid clashes. On both machines formatting and verifying (of DFS discs only) is provided.

At £25 the ROM isn't cheap, and it doesn't really offer anything that isn't on many other ROMs. Unless you need a Master-compatible 'refreshing' editor, or the screen packer, I wouldn't bother.

System Utility ROM, £25 from KM Software, 39 Clos des Ormes, rue Verte, St Lawrence, Jersey, Channel Islands.

Crashproof is available from Avon Computers, 21 Cooper Road Industrial Estate, Thornbury, Bristol BS12 2UW, price £11.50.

Advanced Battery-backed RAM costs £39.95, and Advanced Control Panel costs £34.50, both from Advanced Computer Products, 6 Ava House, High Street, Chobham, Surrey GU24 8LZ.

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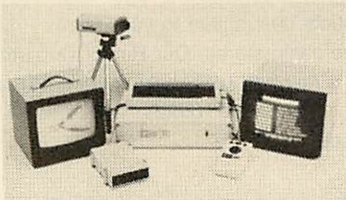
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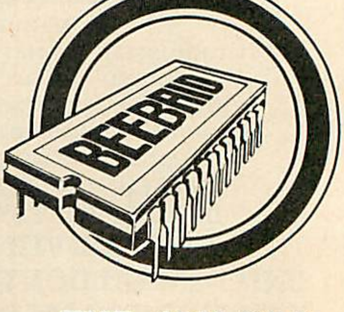
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SOFTWARE

THOSE MAGNIFICENT MICROS...

Ace *Acorn User* pilot Irving Jaquette takes some flight simulators up for a spin

Flying is an infinitely seductive affair, but sadly, a love for aeroplanes is a demanding and expensive indulgence, which can drive its participant to the very edge of financial extinction. Yet it maintains an unbreakable hold on the hapless victim. Never having been one of the lucky few who are paid to fly, I am all too familiar with the side effects of aerial addiction – permanent damage to the bank account, a strong tendency to bore people at parties, and worst of all, those 'lost weekends' when family and friends take a very bad fourth place to flying, flying and flying.

Alcoholics, gamblers and drug addicts can all resort to a variety of self-help organisations to help them snap back to reality. We hopeless pilot-cases have only one way to ease the pangs until the next take-off – simulators.

The hallowed design team of the BBC micro must have included at least one aviation junkie. How else can once explain the feature which makes this computer uniquely suitable for flight simulation software? The analogue port lifts the BBC micro above the serried masses of Commodores, Sinclairs and Amstrads in the evolutionary ladder of simulator hardware.

Using a potentiometer-type joystick linked to the analogue to digital port makes it possible to fly a simulated aeroplane the same way you would fly the real thing. The switch-type joysticks used by other computers make it impossible to reproduce any realistic handling characteristics. If you imagine flying, or even driving a car, with nothing between the straight-ahead and full lock positions you will see why. Even the most spirited aerobatics only rarely call for the stick to be moved right out to the control stops.

Given this rare and wonderful feature you would be entitled to expect that simulation programmers would rise to their feet as one in a spontaneous standing ovation. No? Well, at least they should support the use of an analogue joystick. The fact is that not all do. This goes some way to explaining why some simulations handle like the real thing, whereas others

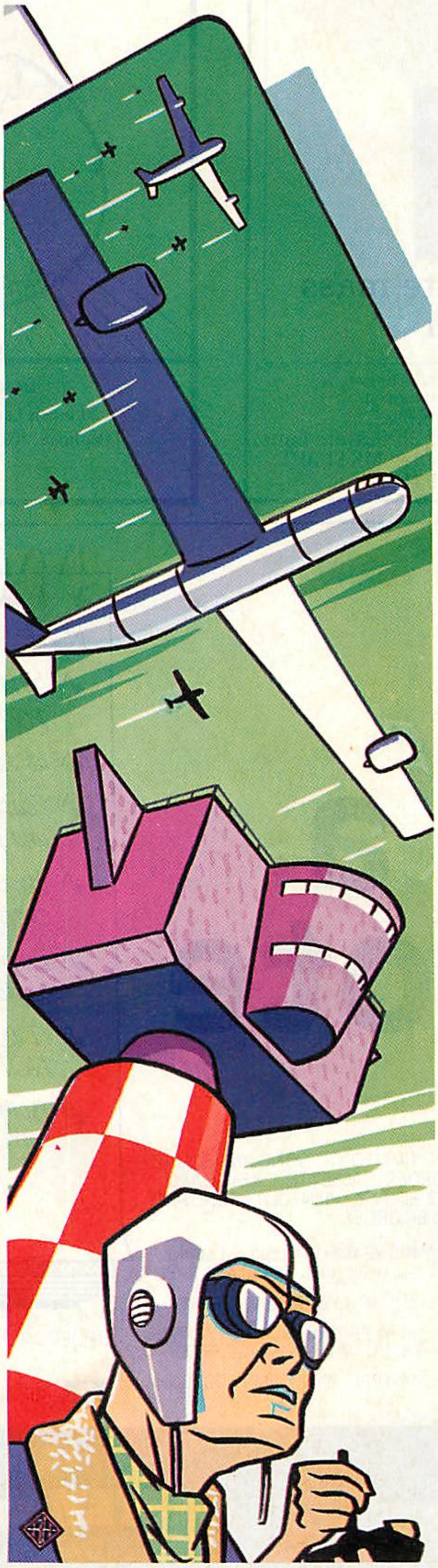


ILLUSTRATION BY RIAN HUGHES

assume the flight characteristics of a badly retarded penguin.

Prince among princes is Geoffrey Crammond. When the superlative *Aviator* was launched by Acorn Soft, appropriately at the Battle of Britain Museum in Hendon, I sauntered nonchalantly up to the nearest computer and waggled the stick enthusiastically in the vague hope that something might respond. Instead of the lukewarm reaction I expected, the simulated Spitfire reared up like a startled racehorse and it took several minutes of frantic flying before I managed to train myself to make the almost imperceptibly delicate control movements necessary for smooth progress. Once learnt the lesson was not forgotten: like its full-size counterpart, Crammond's Spitfire is a touchy thoroughbred which will not tolerate slipshod handling.

Like Crammond's other masterpiece, *Revs*, *Aviator* is a true attempt at simulation, rather than a video game about aeroplanes. This has put off some reviewers and would-be players who have never progressed past the initial steep learning curve. As a regular Chipmunk pilot, I still needed about six hours' flying time of *Aviator* before I felt completely at home with it. I now own three copies to guard against individual tapes or discs wearing out, but the cost of flying time is still a lot less than the £50 an hour it now costs to rent a mundane light aeroplane.

If you are an estranged *Aviator* owner who has never managed to come to terms with it, do persevere. A good understanding of the principles of flight is necessary: the supporting documentation is better than most but still misleads in one or two areas. An extremely worthwhile supplementary source of basic flying knowledge is *Flight Briefing for Pilots Volume One* by Neville Birch and Alan Bramson, a standard work on the subject.

To fly *Aviator* with any precision, an analogue joystick is essential. The standard Acorn sticks are rather too short for fine control, and a firm base for any joysticks is vastly preferable to a hand-held arrangement. An extremely helpful modification is

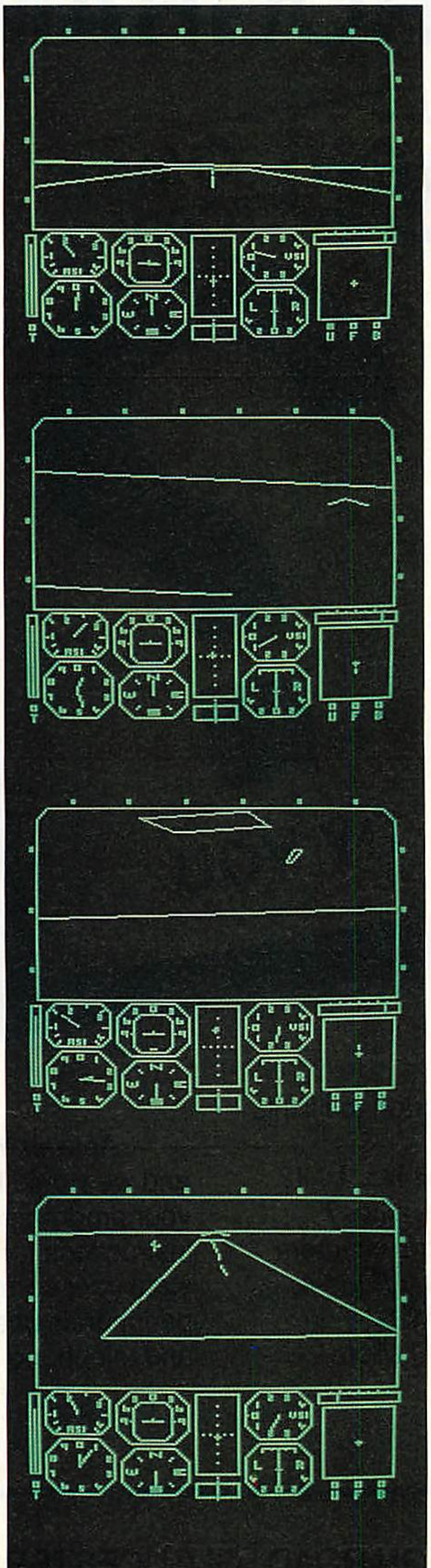
to extend the stick with a sawn-off length of broomstick, a cheap ballpoint pen body or some other convenient implement. This makes the controls much lower-geared, and fine adjustments become a lot easier.

Taking off is relatively straightforward – just let off the brakes, open up to full power and lift off with gentle backward stick movement at any speed over 100 knots. However, the aeroplane is able to accelerate more briskly on the ground than in the air, and keeping the controls slightly forward of neutral will enable you to achieve 200 knots before you run out of runway. This is not advisable in any real aeroplane you may encounter though, as few runways are as perfectly smooth as the *Aviator* example and real-life tyres tend to suffer at these unnaturally high speeds.

Landing the *Aviator* Spitfire safely is fairly easy once you have learned not to over-control on final approach. Lining up with the runway often causes problems for beginners, especially as roll control deteriorates at low speeds. *Aviator* is, in my experience, unique in reproducing the roll inertia of the heavy metal wings. Rolling back to level flight from a turn at low speed, you must centralise the stick slightly before the wings-level position, otherwise you will overshoot into a slight bank the other way.

For an easy landing practise attempt, take off and fly straight ahead, holding the altitude down to about 500 feet until the speed reaches 250 knots or above. Then pull back smoothly into a half-loop. When the inverted horizon comes into view, move the stick forward to maintain steady inverted flight for a moment and roll back to straight and level using full side deflection one way or the other. Then throttle back all the way and slow down to 150. Drop the undercarriage and flaps and go back to about half power to counteract the greatly increased drag.

You should now be on a steady final approach at 110 to 120 knots. Maintain speed by raising or lowering the nose and adjust your sink rate by judicious use of power. Aim for 300 feet by the time the white line appears in the middle of the runway, then make a gentle backward check at about 50 feet over the runway and wait. As the speed drops you should gradually pull back on the stick to keep flying just above the ground. Get your timing right and you will settle at about 80 knots. Throttle back and brake, keeping straight with the rudder.



Taking off (top), flying straight, looping over and rolling prior to landing with *Aviator*

To add to the commercial appeal of the program, *Aviator* has a bolt-on game scenario, the contextual improbability of which makes it look something of an afterthought. Transposed from the Spitfire's natural element to the prairies of mid-west America, you dice with death against giant flying cockroaches. It pays to shoot these up on the ground as the mature flying cockroaches earn fewer points, but in the early stages of growth they are particularly hard to hit without crashing as a result of the explosion's shock-waves. Far better to ignore the game scenario altogether and hone your skills by flying under the local suspension bridge or roaring inverted down Main Street, Acornsville.

Sadly, *Aviator* is available only on cassette and 5.25-inch disc. If you have 3.5-inch drive you are out in the cold. Similarly, even the cassette version seems incompatible with the whole Master series. A source in the know reports that there were plans for a Master-compatible version but that this was mysteriously forgotten. The incompatibility appears to lie in Acorn's over-complicated copy protection rather than Crammond's programming, so if all you Master owners ring up and complain you might get some action.

Meanwhile, what kind of flying fix is available to non-BBC B owners? Doctor Soft has three products available, two variations on a Phantom jet fighter and a Boeing 747. The *747* simulator is the earlier program, and it shows. The graphics are unimpressive and the dynamics are highly dubious. Besides, Jumbo jets are really quite boring in the context of home computer flight simulators. Their main function is to transport large numbers of people comfortably and economically to distant destinations. There's only one of you, and you are going to finish your flight in the same room you started in.

For more entertaining flying, look no further than *Phantom Combat*, which puts you in the ejector seat of the legendary McDonnell-Douglas F4 Phantom. This a less faithful simulator than *Aviator* – which is perhaps just as well, as the Phantom's real-life flying characteristics are as peculiar

and tricky as the Spitfire's are elegant and well-mannered.

The accent is definitely on making your enemy miserable. The enemy in this case is a simple dart-shaped target which none the less flies a mean dogfight. The simulator flies like a real aeroplane, but not particularly like a Phantom. It is more like a modern high technology fly-by-wire number like the F16, with enough thrust to accelerate upwards and easy handling regardless of speed.

This simplicity of handling is very helpful when you are mixing it up with a MIG-21 adversary. The first few are easily dispatched, but more experienced and deadly opponents soon appear.

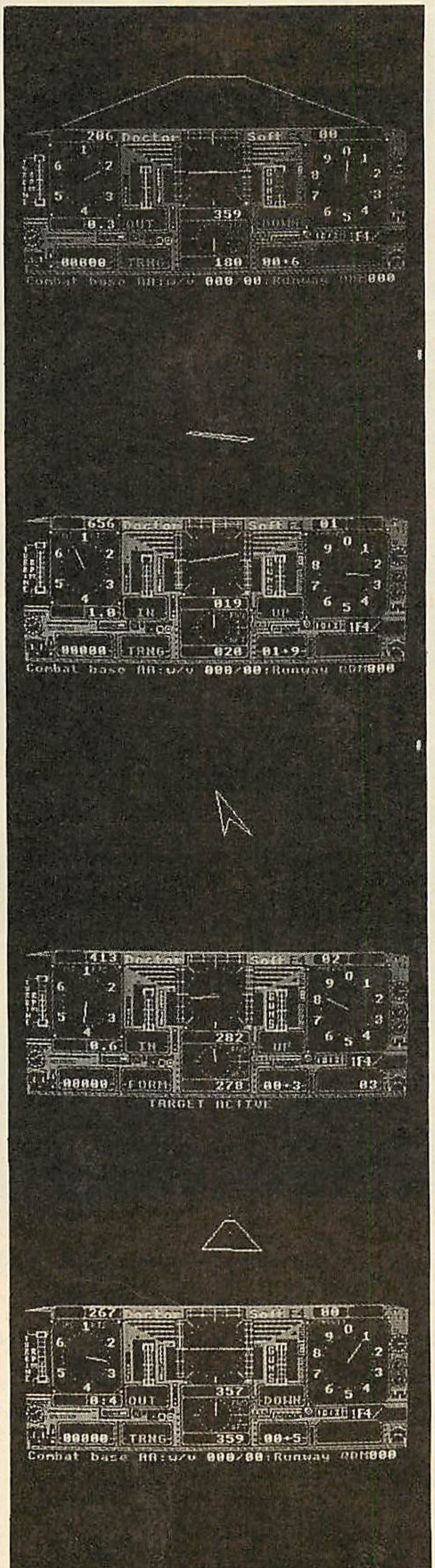
True simulator aficionados with like-minded acquaintances are urged to put together two BBC machines (you must have a disc drive attached) with the *Double Phantom* two-player version. In combat mode each player competes with the other, so that, for instance, in a head-on closure each player can see the manoeuvres of the other out of his own windscreen.

Combat damage is not all-or-nothing as it is when playing against the computer. It takes several good hits to wipe the floor with your rival. If by some fluke he manages to get in a few hits against you, your aircraft will degrade in various ways: first the artificial horizon might go, then you will encounter control restrictions, a loss of power or a possible fuel leak.

The more recent *Strike Force Harrier*, from Mirrorsoft, has achieved a fair degree of commercial success, but this has been among game players rather than simulator buffs. Far too much of the BBC micro's power is devoted to creating a war-like scenario with pretty colour graphics for there to be much in the way of realism.

The vector-drawn line graphics of *Aviator* and *Phantom Combat* may be somewhat simplistic but they are updated much more quickly and smoothly than the jerky *Strike Force Harrier* can manage. The acute agility of the real Harrier is not accurately represented, with the pitch rate in particular putting one in mind of the Graf Zeppelin rather than a small jet fighter-bomber.

Nevertheless, *Strike Force Harrier* does have a following as a strategy game demanding considerable thought and skill and it would be churlish to deny its appeal to those who want a good zap. Just don't expect flight simulation in its proper sense.



Taking a Phantom through a similar set of manouvres with *Phantom Combat*

With the mainstream options covered, a few interesting products lurk on the computer-flying periphery.

Anyone with an interest in the programming side of flight simulations should look out a copy of *Jumbo* by Molimerx. This simulator was the first I ever found for the BBC micro, being descended from a TRS-80 program.

Considering the standards of the very early 80s it is a worthy achievement, particularly as it is written in Basic. Stop sniggering! – it works surprisingly well and has the great virtue that you can get into the program to see how it works. The Basic listing is full of old-fashioned spaghetti-type constructs as you might expect from a TRS-80 conversion, but it is easy to follow and can be modified to very entertaining effect to suit your own demands. Want more power? Just bolt on a few supplementary engines. Not enough fuel? Add on some extra tanks for a non-stop global circumnavigation.

More useful for genuine pilots wishing to keep in practice than for enthusiastic amateurs is *Micro Nav II*, which closely resembles the kind of instrument flying simulator found at flying-club level. This is essentially all about navigation procedures and instrument approaches, and as such is both instructive and enjoyable for people with a serious interest in aviation. Don't look to this one if you're interested in gee-whiz aerobatics or neutralising the Soviet threat, though.

Finally, one very well-known British ST and Amiga programmer has been using an Acorn RISC development system for some time, and the grapevine indicates that the Archimedes version of his flight simulator makes anything seen so far on fashionable machines like the ST look like something on a 4k Atom. Even allowing for a standard degree of youthful over-enthusiasm from programmer X, this sounds highly promising.

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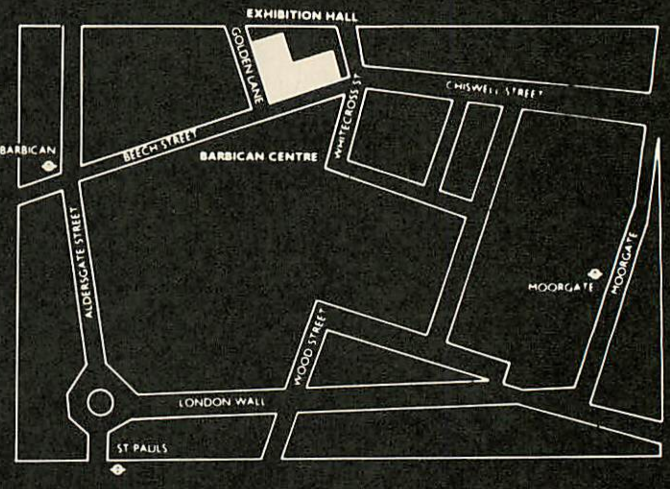
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BUSINESS

REPORT BACK ON YOUR IDEAS

In April we asked for your ideas for business and pleasure computing. The response covered railways and music!

Roger Carus

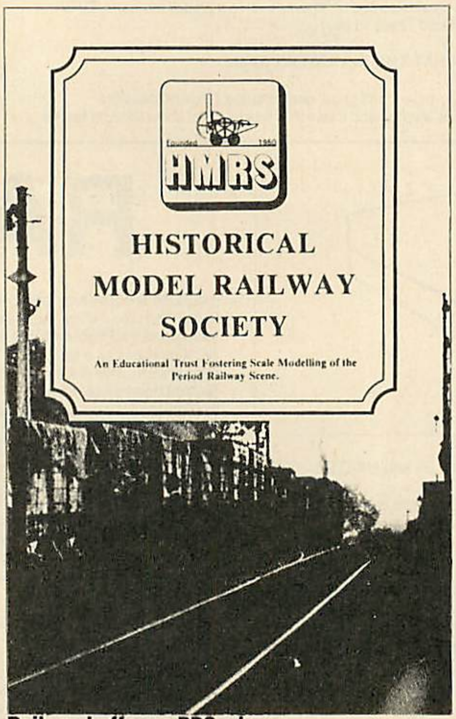
My article in the April edition inviting readers to share their ideas about ways of using the micro for business or pleasure produced some interesting mail which is still coming in over a month later. Do keep the ideas flowing!

The replies have been a mixture of general tips, a few programs and some items for review. Although the last was not what was originally intended, the replies were interesting for all that. If anyone is interested in any of the items mentioned here, I will be happy to forward their letters to the originators, but I will not publish addresses except where software dealers are concerned.

One of the largest micro users to write in was Peter Stevens of Lowestoft, who told me about the problems of keeping the membership list of the Historical Model Railway Society. This had been kept on an IBM System 38 minicomputer, but was forced to move to a private microcomputer system. With 1500 members in the records at the time of the change, they had big problems, but all has come right and they now happily look after nearly 2000 members on a BBC micro.

As Peter pointed out to me, the new system 'helps generate income for the society through mailshots, it supplies a variety of information on membership status, checks subscription payments and takes the sting out of compiling data for the Inland Revenue'. Other large clubs could easily do the same.

If the railway enthusiasts were happy with their system, not everyone was so pleased with their own purchases. P G Taylor from Uttoxeter, who is a professional accountant, wrote about his experience in buying a sideways RAM board. The first one was eventually returned to the supplier after producing a continuous buzz which could not be traced and a different one was then ordered from Peartree Computers at Huntingdon. Mr Taylor's story had a happy ending because



Railway buffs use BBC micros

when the same fault appeared in the new board, Peartree carried out a careful check and discovered that the problem arose because the DFS had been relocated in the wrong socket. The moral of this is that if a firm takes the trouble to help its customers then it deserves support.

A different kind of response came from Professor Moore from Aberdeen, who sent three useful programs which he had developed. On his own admission they are not elegant, but they do work efficiently.

The first is designed to draw a 'population pyramid' to illustrate the distribution of the ages of the population, something that economists, geographers and statisticians need to do quite frequently. The collected data can then be dumped to an Epson printer and converted to slides for projection if required.

A second program works out the distances between points on a map whose grid references are known, using the gazetteer of the Ordnance Survey Atlas, and along with the previous one it would be useful in any school where there is a BBC micro in the geography or mathematics department – as there certainly should be these days.

His third program is a simple one which works in conjunction with a *View* document to sort the words alphabetically and so help to construct the basis of a simple index. There are many such programs in existence, but his has the virtue of being both simple and cheap.

Not all the information sent to me was about technical uses, and one which arrived from Jim Brook of Bromsgrove told of using the Island Logic *Music System* to help him learn music in connection with an amateur operatic society, without the need for an accompanist. He produced a tape of the tricky timing of notes and musical phrases using the micro and then can practise at his convenience – even while driving the car.

My last one for this month brings out a feature that we should all bear in mind. I had a good idea from Mancunian Roger Gibbons for improving a program for plotting time/temperature graphs by adding a relative humidity procedure. It is useful and deserves mention but, as he innocently mentioned, the program was originally printed in another journal. This means, of course, that the copyright belongs to the originator, and without proper permission it cannot be sold. I have suggested to him that he offers it to that magazine as an update, and they should be pleased to get it.

IDEAS WANTED

If you make use of your micro for business or pleasure, or have written a piece of useful software, and would like to share your knowledge and experience, write to Roger Carus, c/o *Acorn User*, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF. Or use British Telecom Gold: 81:RED001.

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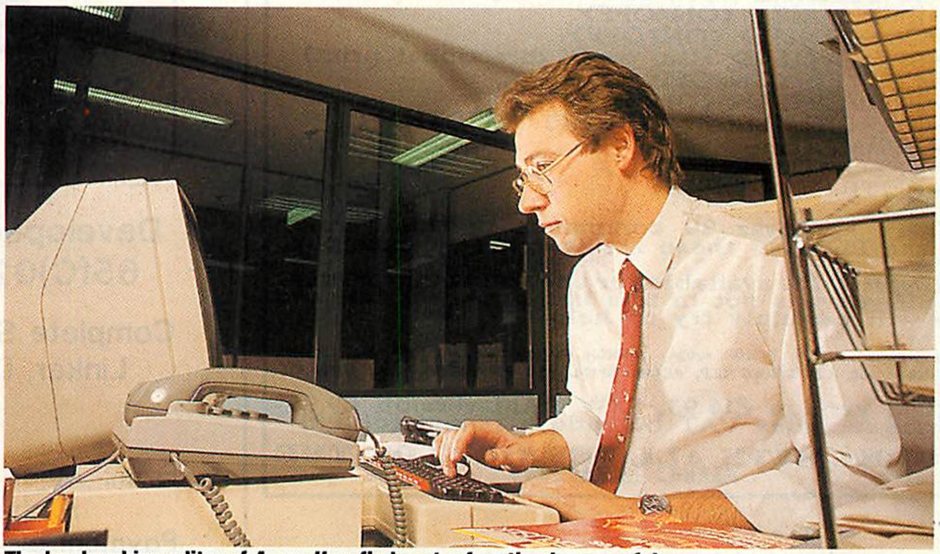
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BUSINESS

CUT DOWN ON KEYSTROKES

Graham Bell adds some useful function keys to make *View* wordprocessing easier

Many people have now acquired printer drivers for the *View* family. These are small programs that allow you to control your printer, and get bold or underline effects in your *View* text. Printer drivers can be created for any printer by the Acorn Printer Driver Generator. This package also adds two extensions to the original *View* concept. First the screen driver to emulate bold, italic or underlined print on the screen, and second, the idea of 'extended highlights'. These are multiple combinations of the two ordinary highlights (* and –) used to switch all the various print styles, without having to use the HT command to redefine the code for each new effect. The Printer Driver Generator adds convenience to *View*, but there is a problem associated with the new extended highlights. Can you remember them all? Here is a method for single key entry of the highlight sequences together with the construction of your own customised editing functions. It pays to increase your *WORD power!



The hardworking editor of *Acorn User* finds extra function keys useful

Single key entry

It sometimes isn't easy to remember all of the extended highlight sequences, so listing 1, on the yellow pages, is a way of defining the red function keys to allow them to be typed with a single key press. The listing is not a Basic program: it can be typed in with *View* itself, then saved in a text file called 'EXTKEYS'. Then enter:

*EXEC EXTKEYS

in *View* command mode. Alternatively, the text can be put in your !BOOT file. The red keys are defined to give the following extended highlight sequences:

Shift-CTRL-f2 alternative font on/off
Shift-CTRL-f3 subscript on
Shift-CTRL-f4 sub- or super-script off
Shift-CTRL-f5 superscript on
Shift-CTRL-f6 italics on/off
Shift-CTRL-f7 bold on/off
Shift-CTRL-f8 *ViewIndex* index mark
Shift-CTRL-f9 reset printer
Shift-CTRL-Copy exact space (*@)

Furthermore, the cursor keys with Shift-CTRL will move the cursor eight times faster than the cursor keys alone. The keys have to be pressed in combination with both Shift and CTRL together, so as not to clash with *View*'s built-in editing functions. To put an italics code in your text, simply hold down CTRL and Shift, and press function key 6.

Italics, bold, subscript and so on can be marked on a function key strip so they can be referred to easily.

Bespoke editing functions

There are some handy editing functions that are absent from *View*. One of these is a Delete Word key. To delete a word 'by hand', the cursor is moved to the first letter of the word, then Shift-f3 (Delete up to Character) is pressed, then the space bar. This can be programmed into a red key:

```
*key 0 "¦!¦_ "
```

So when the cursor is on the first letter of a word, pressing Shift-CTRL-f0 would delete the word in one go. The '!¦_ ' in the key definition represents the Shift-f3, and it is followed by a space. This exactly matches the way you delete a word by hand but is much easier.

To use this new editing function, you don't have to use EXTKEYS. If the new soft key definition is going to be used without EXTKEYS, then beforehand type:

```
*fx 228 1
```

in command mode, to ensure that Shift-CTRL-function key combinations are interpreted as soft keys.

A major improvement upon this definition is:

```
*key 0 "¦!¦Y¦!¦Y¦!(¦!¦_ "
```

With this definition, the cursor doesn't need to be under the first letter of the word to be deleted (anywhere from the space immediately preceding the word to the character before the space preceding the next word will do). Unfortunately, neither will delete the last word on a line.

Note the use of quotation marks in the key definitions: they are not usually needed for defining soft key strings, but they do make spaces at the beginning or end of the string visible (there is one space at the end of each of the above definitions).

In fact, almost any series of key presses can be programmed into a red key. Other editors use this system too (*Wordwise* for example, and *Edit*, the Acorn screen editor in the Master 128 ROM), but the relationship between the original key presses and the string required in a *KEY definition is different for *View*. All these strings are given in figure 1. The only two points to watch are that Escape can only be

emulated in text mode (so '|[' in a *KEY definition will make the wordprocessor return to command mode, but not go from command mode to text mode), and that one soft key definition may not refer to another (you can't incorporate the Delete Word function directly into another definition, so there is no string given for Shift-CTRL-f0).

Using this soft key string technique, you can invent numerous useful macros of your own. For example, a 'Delete Beginning of Line' function might be needed:

```
*key 1 "|!#2|!|P|!#1|!,"
```

If, after looking at figure 1, the workings of this and the improved Delete Word definition are clear, then writing new functions should be no problem. Otherwise, think of the definitions split up into steps as shown in figure 2. Easy!

The file EXTKEYS leaves f0 and f1 free for such macros, and you could use f12 to f15 as well (these are the fast cursor keys), without losing the single-key entry of extended highlights.

```
Function keys

f0      |!|L    Shift-f0      |!|\    CTRL-f0      |!,
f1      |!|M    Shift-f1      |!|]    CTRL-f1      |!-
f2      |!|N    Shift-f2      |!|^    CTRL-f2      |!.
f3      |!|O    Shift-f3      |!|_    CTRL-f3      |!/
f4      |!|P    Shift-f4      |!      CTRL-f4      |!0
f5      |!|Q    Shift-f5      |!!     CTRL-f5      |!1
f6      |!|R    Shift-f6      |!"     CTRL-f6      |!2
f7      |!|S    Shift-f7      |!#     CTRL-f7      |!3
f8      |!|T    Shift-f8      |!$     CTRL-f8      |!4
f9      |!|U    Shift-f9      |!%

note Shift-f4 includes a single space after the !


Cursor keys

left    |!|X    Shift/left    |!(     CTRL-left    |!8
right   |!|Y    Shift/right   |!)     CTRL-right   |!9
down    |!|Z    Shift/down    |!*     CTRL-down    |!:
up      |!|[    Shift/up      |!+     CTRL-up      |!;


Other special keys

Tab     |I      Copy          |!|W    Delete       |?
Return  |M      Shift/Copy    |!'     Escape       |[

to insert " or | into the key string, use |" or ||
```

Figure 1. Key definition strings for bespoke *View* editing functions

```
Delete Beginning of Line

|!#     Shift-f7      set marker
2                     marker number two
|!|P    f4            beginning of line
|!#     Shift-f7      set marker
1                     marker number one
|!,     CTRL-f0       delete block between markers


Improved Delete Word

|!|Y    right         two spaces right
|!|Y    right
|!(     Shift/left    go back to start of word
|!|_    Shift-f3      Delete up to character
        SPACE         delete to next space
```

Figure 2. Some examples of customised editing functions

Exec files

As well as the familiar !BOOT file and the EXTKEYS file described above, exec files can be made to do all sorts of other things. But some useful files require control codes in them that can't be typed into *View* and saved. So a new method of creating these files has to be used. Listing 2 on the yellow pages is a small Basic program. Type it in and save it. When it is run, it creates a new exec file called 'NLQ'.

So in *View*, type:

*EXEC NLQ

It switches your printer's typeface to near letter-quality mode. This works whether you are using a printer driver or not, and with any Epson-compatible printer. For Kaga/Taxan or Canon printers (except the A series), you'll have to change line 90 to:

```
90 VDU 2,1,27,1,ASC"(",3
```

because these printers select NLQ in a different way. A benefit of this exec file approach is that the same idea can be used in Basic or any other language, not just *View*.

This idea can be used to send other control codes to the printer. You could modify the Basic program to use:

```
70 *SPOOL RESET
90 VDU 2,1,27,1,64,3
100 PRINT "Printer reset"
```

The RESET exec file which this produces resets the printer.

A more ambitious program using the technique is listing 3. This is for the Epson FX and LX printers, and other printers that have a downloadable character set, such as the Kaga-Taxan, and Canon printers. This program produces as exec file called 'POUND'. It should not be used in conjunction with a *View* printer driver.

One of the many problems with using the Acorn micros with a printer is that the characters you see on screen don't match what is printed on the paper. Hash (#) and pound (£) are the most common culprits. The POUND exec file changes the printer's characters to match those of the micro, so ensuring 'what you see is what you get'. To set it all up, just type:

*EXEC POUND

This program is especially useful when listing Basic programs – *Acorn User* uses something similar to print the yellow pages.

Around the World in 40 Screens

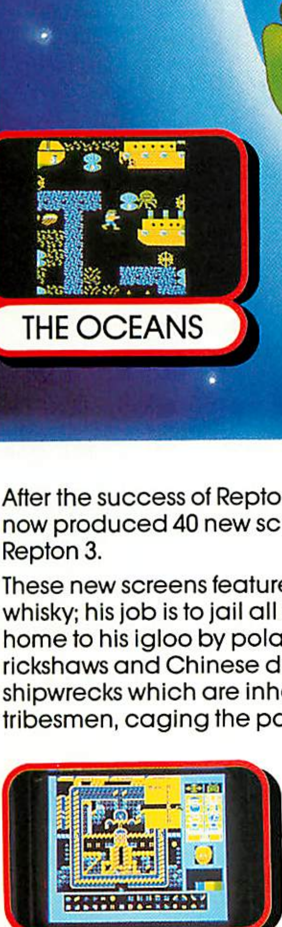
REPTON



Repton Returns . . . to Conquer the World

After the success of Repton 3, we were overwhelmed with requests for us to publish another set of screens for the game. We have now produced 40 new screens which, although enticingly amusing, are even trickier to complete than the original 24 screens of Repton 3.

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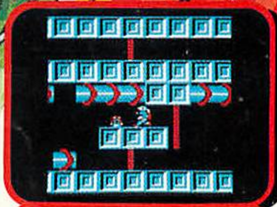
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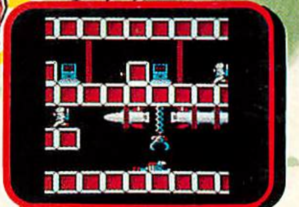



The Dramatic Loading Screen


Climbing up a rope (SURFACE DEFENCE)


Flying with a jet-pack (ANCIENT SHRINE)


The elusive "Herbert" Droid (CREW'S QUARTERS)


Crawling under a crane (MISSILE FACTORY)

Commander John Stryker is back in CODENAME: DROID

Stryker's Run was one of our most successful releases of 1986. It stayed at the top of the BBC Micro software charts for six weeks and received several glowing reviews: "The graphics are stunning . . . This should be in every collection" enthused A & B Computing.

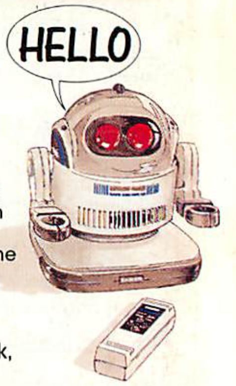
Now CODENAME: DROID presents a new challenge for Commander John Stryker. He has been commissioned by the Allied Nations to undertake another perilous mission in their continuing struggle against the warmongering Volgans.

His task is to locate and seize the Volgans' latest weapon: a new spacecraft (codenamed the Z11) which is equipped with the revolutionary matter/anti-matter warp drive facility. Stryker must land on the mysterious planet Volga, penetrate the Volgans' underground defence systems, find the spacecraft and requisition it.

As Stryker descends below the planetary surface, he will pass through 4 different zones of Volgan activity:-

- The Surface Defence — an array of steel girders, ropes and chains lies coldly between the crusted white rock walls.
- The Ancient Shrine — a stone-walled temple bedecked with hideous gargoyles and rusting chandeliers.
- The Crew's Quarters — the Volgans' relaxation area: tables and chairs are arranged invitingly amongst the essential ventilation pipes.
- The Missile Factory — clinical psuedo-metallic walls surround the missiles, bombs, and computers of the evil Volgan race.

Your character in the game can jump, run, kneel, crawl, climb up and down ropes, fire his laser blaster and drop mines. He can also fly for short distances using his jet-pack, and access information via his wrist terminal computer.



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